THE ENGINEERING AND MINING JOURNAL.

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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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THE OUTLOOK IN THE COAL TRADE.

THE auction sale of the 29th ult., at which 500,000 tons of anthracite were disposed of, proved, as we had anticipated, a mistake. Following so soon on the fall of the Combination, every one anticipated exceedingly low prices, and the feeling seemed to prevail that now that the Combination had failed, there was nothing to hold up prices, and that coal could be bought at any figure offered. Moreover, there was probably a "bear" feeling on the part of some of the coal men, that tended still further to weaken prices. The companies would, we believe, have acted more wisely to have let the market gain tone by moderate sales at first before forcing large amounts on it. As it was the coal was "slaughtered," bringing the lowest rates for which it was ever sold in New York, about a dollar per ton less than bare cost.

Of course it is folly to expect that coal can be sold for any length of time at a loss, and the cost of mining and transportation to-day would not allow, without loss, of a price much below $4 per ton f. o. b. at the shipping ports. Cost of production will now be considerably lessened, wages will be largely reduced—probably as much as 25 per cent.—and a thousand little items which were formerly passed as essential, will now be lopped off. Till the demand for coal has increased, the more expensive mines will be closed, and all others worked at their full capacity. A greater economy in mining and in the preparation of coal will be sought for and found, and the plan which we have long been advocating, of investigating, in a systematic, thorough manner, the question of the best manner of breaking and preparing coal, so as to lessen, as far as possible, the present waste—which amounts to from 25 to 33 per cent. of all the coal passing through the rolls—will follow before long. Underground haulage by mechanical means, will, doubtless, also receive more attention than it yet has, and the very wasteful system of mining now in use—the same with but little modification which has prevailed since the opening of our mines—will in time secure such modification as the progress of the art of mining demands. In short, the coal trade is about to pass through an ordeal similar to that which the iron trade is going through, and the result will be the same. The cost of production which many of our mine owners to-day consider as low as it is possible to get it, except perhaps in the few cents a ton which can be taken off wages, must and will be reduced to an extent that even our progressive "operators" now deem impossible; and selling prices that to-day are considered to be, and are, absolutely ruinous, will be looked upon in the not very distant future with much more complacency. We anticipate for some time in the future, the reign of prices for coal, as for iron, lower than have ever before obtained in this country, and this not because of "war" among the coal companies, but rather as the consequence of the relative proportions of supply and demand, and the natural tendency of the laws of trade and progress in the arts.

The coal companies must look to larger business and greater economy to compensate for smaller profits on the ton, and they will, in time, though possibly through much tribulation, accommodate themselves to the new conditions of the trade. At the present time, the principal depressing influences in the mining districts—confining our remarks to the anthracite fields—is to be found in the excessive capacity of our mines, and the great superabundance of labor. The conditions of the coal trade have been materially modified in late years; where formerly the greater part of the year's business was crowded into the Summer months, the colliery capacity, in mines and laborers, had to be maintained at the maximum required in the busiest season, and wages had to be maintained at such a rate as would enable a large number of these men to pass several months of the year in enforced idleness. Now, however, since access to nearly all the markets can be had by rail, there is no longer any occasion for dealers or consumers to lay in large supplies during the season of navigation. The demand for coal has become more evenly distributed throughout the year, and, as a consequence, there is need of a smaller colliery capacity, and of fewer men at the mines; while those who are required, having more constant employment, can accept wages much below the rates they have received under the old *règime*. The natural growth of the trade, greatly promoted as it will be by the low prices that must hereafter obtain, will soon bring the demand for coal up to the capacity of the works; but till that point is reached there will, necessarily, be a sense of depression (not altogetner well founded) in the coalfields, and the cost of production will be weighted with the over-investment of capital in "improvements" rendered unnecessary by the altered conditions of the trade.

We look to the future with hope and confidence. Even the anthracite coal trade, still in its youth, could not expect to arrive at the strength and enjoyments of manhood without some of the reverses (knock downs) and tribulations incident to the growing age; and the lessons of adversity, though unpleasant to learn, will place the trade upon the basis of a solid prosperity, that it could never attain without them. There are few, possibly none, of our coal operators to-day who appreciate the extent to which the cost of producing anthracite can, and will be reduced. These economies will come gradually, with the adoption of improvements, which cannot be introduced all at once, for many of them are not even known or suspected; but the fact that the laws of trade, the growth of our industries, and other causes, near and remote, seem to foreshadow for the future, during some years to come, low prices in coal, should stimulate "those whom it may concern," to find the means of meeting the problem successfully.

The coal regions will benefit by the increased production of coal, even though prices may be low, and values there will not decline with the mining companies' profits. The workmen, with more constant employment, even at reduced wages, will be better able to pay their debts, and the depressing influence of idle men will be removed by the emigration to other fields of the surplus, who must now see that anthracite mining offers no greater, perhaps fewer, advantages than most other classes of work.

The bituminous trade, to a certain extent, will be affected by the movements in anthracite, but in the West it has, generally, an independent field, and through open competition, is further advanced in the solution of its difficulty than is the anthracite trade.

On the whole, we see through the clouds now hanging over it, much that is encouraging in the outlook. A full appreciation of the situation may avert some of the dangers that threaten and lessen the effect of others; while the revival and rapid growth of our general industries, which will be promoted to a greater extent than is generally believed, by the low prices of coal, will bring with it the large dividends that for the present the companies must be satisfied to forego.

NEW PUBLICATIONS.

THE AMERICAN IRON TRADE IN 1876: Politically, Historically, and Statistically Considered. By JAMES M. SWANK, Secretary of the American Iron and Steel Association. *Annual Report* to January 1, 1876. Philadelphia, 1876.

The indefatigable Secretary of the Association, inspired by the greatness of a Centennial opportunity, has prepared a more extensive report than usual, comprising two sections of undeniable value, and one concerning which opinions will doubtless differ. The portions in which Mr. SWANK, perhaps, takes the less pride, but for which he deserves the more praise, are the Historical Sketch of the American Iron Trade, and the statistical summary of products and prices in iron, coal, etc. The portion which is peculiarly appropriate, in his opinion, to "this Centennial Year," combines a slashing attack upon effete, corrupt, tyrannical, doomed but still dangerous Britain, with an argument in favor of protective tariffs, of which we shall have something to say presently.

The historical sketch is a timely contribution to the literature of a subject which has waited too long for its chronicler. Mr. SWANK frankly declares that the success of his attempt to rescue the leading facts in our iron history from threatened oblivion or inextricable confusion, is incomplete. Nevertheless, his compilation will be welcome for reference, and may awake an interest among those who have personal knowledge of the facts, leading them to furnish the corrections and additions needed to perfect it. Whether he has had access to the sheets of Mr. PEARSE'S forthcoming work on the same subject, we cannot say. Probably the two narratives are independent. In that case, it may be expected that Mr. PEARSE will throw much additional light on the matter. Meanwhile, we take occasion to make our own small contribution, on a single point which has attracted our attention. Mr. SWANK says (p. 128) that there was a furnace at Durham, Pa., "as early as 1743." If he will look in the exhibition of the Lehigh Valley Ironworks at Philadelphia, he will find the keystone of the old Durham furnace, bearing date 1727.

The statistical summaries include statements of the production of pig and rolled iron, steel, coal, etc., for many years past, compiled and arranged by Mr. GEORGE W. COPE, on whose conscientious assiduity they reflect great credit. Tables of exports and imports, on the authority of Mr. YOUNG, Chief of the Treasury Bureau of Statistics, are also given; and tables of prices, largely prepared by Mr. NEILSON, the present accomplished and efficient Secretary of the Centennial Committee of the American Institute of Mining Engineers. In view of these historical and statistical portions, the pamphlet of Mr. SWANK is admirably adapted for the use of foreign visitors, such as have been among us

for the last few months in large numbers, studying our natural resources and the arts connected with their development.

The first part of the book, however, is evidently intended for domestic consumption; and we wish it had been issued as a separate volume, so that we could present the second part, without it, to gentlemen who did not wish to be insulted, or care to be amused by the style of Mr. SWANK's argument for protection. In his introductory letter he says:

"Good men of all parties, and the young men of our country, who are not educated in our free-trade colleges, are hungry for facts which prove the correctness of the proposition, that protection is a blessing and the fountain of blessings to the country that adopts it and steadily adheres to it; and I have felt that no better service could be rendered to the cause of protection, than to present, in popular form, as many of these facts as could be conveniently compressed into a small but not too narrow compass.

"In examining the policy of protection in the light of undoubted facts, I have found it to be impossible to ignore the industrial example of Great Britain, and much against my inclination, I have commented upon it at some length. If the manufacturers and merchants of that country did not steadily pursue the policy of ungenerous and offensive interference with the domestic affairs of other countries; if they did not send emissaries to this country to corrupt our press and debauch our legislators in the interest of so-called free trade, which benefits them and is an injury to us; if they had not, within the past year, organized their Iron Trade Association, avowedly to secure, where possible, a modification of all foreign tariffs that the British iron trade may be strengthened, and the iron industry of other countries may be destroyed, it would not have been necessary in this report to show the weak side of British commercial character, and the sad results to British workingmen of British efforts to monopolize the world's important manufactures."

This nauseous stuff about "British emissaries" (we are glad to note, by the way, that "British gold" has been handed over as stock in trade to Senator JONES; and we trust it will not turn up again in Mr. SWANK's writings), is a pitiable product for an American pen, in a "Centennial Year." It is just the strain which used to be piped by the advocates of slavery. In those days everything would have been lovely, but for "British emissaries of abolition." In the name of a free press and a land of free speech, we welcome all emissaries of any doctrine to the open discussion of it. Truth has nothing to fear; and true manliness will not whine over fair discussion, or brand as "debauchers" and "corruptors" the honest advocates of differing views. Of course we know that Mr. SWANK'S complaint is largely Pickwickian, like the celebrated speeches of Mr. WHARTON, to which it bears a suspicious resemblance. Personally, he likes the "emissaries" very much; gives them compliments, and facts, and dinners; avoids discourteous attacks upon them (usually) while they are his guests; and, doubtless, as he bids them *bon voyage* to their native clime of oppression and misery, slips this memorial volume into their hands, with the hint that certain passages are not intended for *them*. But how does that help the case? If to complain seriously of free debate is pusillanimous, how much better is he who pretends a cowardice he does not feel?

When we come to examine Mr. SWANK'S argument, we find it indeed a collection in small compass of nearly everything that can be said in favor of a certain theory of protection—a collection, indeed, so comprehensive that the parts do not fit together. We are even left to gather by inference what is meant by protection. Since it is "not incompatible with revenue," it is apparently not prohibitory; yet the logic of many arguments advanced goes straight to the point of prohibition; and remembering the wails of the *Bulletin* over the small residuum of foreign special brands of iron imported into this country, we feel quite certain that Mr. SWANK does want a prohibitory tariff on iron. Again, we are not told on what principle protection is to be granted. The logic of the arguments advanced goes to the protection of all industries to the point of prohibition. And yet there is a lurking sense in the reader's mind, that with due courtesy toward wool, and silk, and salt, etc., Mr. SWANK thinks chiefly of iron. Most confusing of all, there are a large number of earnest arguments which apply, in the present state of the iron business particularly, to the protection of one part of this country against another; and here we fancy that though the hand is the hand of SWANK, the voice is the voice of Pennsylvania.

Is there no point, then, short of such absurdities and incoherencies? Must every protectionist talk like a lunatic? We think the reader of Mr. SWANK'S edition of WHARTON will conclude with us that his sad blunders come from an attempt to claim and prove what is at once too much and too little, summed up in his fundamental proposition that "protection is a principle, not an expedient." This means (if it means anything) that protection should be given at all times, under all circumstances, to all domestic industries—that it is always needed and always good. The fact is just the opposite. Protection is sometimes needed, and sometimes not; in some cases a benefit to the country, in some cases not; in some degrees wise, when, in larger degree, it might be unwise. The duty is sometimes paid by the consumer, sometimes by the producer; it sometimes increases, and sometimes diminishes production or price; in a word, everything that Mr. SWANK propounds on the subject is true or not true, according to circumstances of which he takes no account. Every individual demand for protection is a problem in statesmanship by itself. The general tendency of thinking men may or may not be toward free trade; for that we do not care at present. Sensible people know very well that the United States will continue to have a tariff. The great labor before us is the proper adjustment, and perpetual, yet not fitful and wanton, readjustment of that tariff, in such accordance as poor human wisdom can command, with the needs of the country and the courses of trade. Light on that problem, and on each of its complicated elements, is most welcome; but war-whoops against Great Britain, and clumsy ascriptions of all her social evils to free trade and all our blessings to the opposite policy, are simple superfluity. Least of all does it become philosophers, whose pecuniary interest in their own theories is so openly avowed, to attack the motives of their opponents as selfish and narrow. Mr. SWANK does not represent the science of political economy; he represents a society of worthy ironmasters, principally of Pennsylvania, who are trying in this way (exactly how, we presume they do not themselves understand) to "revive the iron trade." Many of them, for the same reason, want soft money, interconvertible bonds, and other political cathartics, to start internal activity.

We should be quite content to see them pursue their way, spending their own money (not British gold, of course) in this sort of agitation, but for our earnest sympathy with them in their object, greatly as we differ concerning the means. Having this sympathy (for we depend as directly upon the mining and metallurgical industries for our support as do the miners and manufacturers themselves) we regret that the tendency to run for legislation as the remedy in all troubles of the trade should have gained such control over the Iron and Steel Association. Here is the iron business, sick to death of home competition and over-production, and far beyond help from any kind of a tariff—and Mr. SWANK and his assistants preaching over the patient their untimely abuse of other schools of medicine and empty praises of their own! However, that will do little harm beyond delaying recovery. The greater evil which we fear is the reaction in the popular mind against even reasonable and seasonable protection, which may be the result of all this ill-timed and reckless outcry. The time has been when the iron business needed the maintenance, or the increase, of protective duties. It may come again; it is certainly not here at present. But it is one of the standing arguments against protection that the young and imperiled interests which receive it become greedy as they grow strong, and stretch their demands beyond their needs. This argument has truth in it. It is qualitatively though not quantitatively effective; that is to say, there is a real peril of this kind, yet that peril should not prevent the wise nurture of varied industries by appropriate legislation. But people who belong to industries not protected may fail to reason calmly on the matter; and there is great danger that in a grand reaction against "grasping monopolists," etc., etc., the just claims of the iron trade, for example, may be wholly denied. Common sense suggests that this trade, like every other, should ask for nothing that it does not really need. As for the policy of seizing upon a time when the question is practically dead, to utter the most extravagant propositions concerning it, it is as foolish as the choice of the "Centennial Year" for an anti-foreign tirade is *malapropos*. *

WURTZ'S GEOMETRICAL CHEMISTRY.

PROF. WURTZ has published in pamphlet form his *Geometrical Chemistry: First or Introductory Memoir*, printed in the *American Chemist* last March, and partly reprinted in our columns subsequently. We have spent some time in the study of it, without being able to determine how much value should be given to the numerical coincidences upon which Prof. WURTZ's theories are based. We feel quite certain that he goes too far in attempting to bring into accord with his hypothesis many natural mineral species, of which it is well known that they are varied in chemical constitution by isomorphism and by accidental constituents far too widely to be good evidence as to any law of atomic volume. Prof. WURTZ would have gained much by stating his case with greater simplicity and clearness and keeping his conclusions, his triumph, his poetry, and his universal applications altogether apart from his facts. It is undeniable that his memoir is obscure. Nevertheless, we think the relations he has discovered exist, though they may not mean what he thinks they do.

Prof. GUSTAVUS HINRICHS, of the Iowa State University, in the last number of the *Popular Science Monthly*, attacks this memoir with considerable acuteness, and more bitterness. It is a great pity that Prof. HINRICHS, who is a good chemist and mathematician, should seem so utterly ignorant of the manner in which discussion should be carried on with courtesy. We should have been very glad indeed to see a candid and kindly review of this subject from his pen; we feel that there is force in his characterization of such handling of figures as "indeterminate analysis;" but there is neither force nor good taste in his savage attack on Professor WURTZ. That gentleman, though he may indeed deceive himself as to the importance of his calculations, or fall into errors which careful critics can expose, is neither a charlatan nor an idiot, but a chemist of acknowledged skill and a sincere and conscientious worker. Prof. HINRICHS should have learned a different tone from the recollection that his own peculiar theories of "atomechanics" have been suspected (we do not say justly) of resting upon vague coincidences and "indeterminate analysis;" that his views of crystallography are particularly heterodox; and finally, that he has had occasion to complain more than once of the treatment he has received from scientific men. We tell him frankly that such ferocious criticism as he has just perpetrated will make everybody think he is trying to gratify some private grudge—everybody, that is, who does not know him. We, who do know him, are well aware that the article in the *Popular Science Monthly*, though it doubtless represents his honest opinion, *mis*represents his kindly heart. *

IMPROVED ZINC WHITE.—The liquor from washing crude barium sulphide is mixed with equal parts of zinc chloride and sulphate. The precipitate is pressed and dried, then heated, and thrown, when hot, into cold water. The resulting powder is of superior quality.—*American Chemist.*

GOLD EXHIBITS AT THE PHILADELPHIA EXHIBITION.—II.

Special Correspondence of the Engineering and Mining Journal.

VICTORIA, AUSTRALIA, (*continued from page* 136).

SPECIMENS from nine gold-bearing quartz veins at Dunolly are exhibited in the Victoria mineral display. They do not vary much in character, nearly all being composed of bluish-white amorphous quartz, containing generally more or less blue slate. Imbedded in the quartz fine gold is frequently seen. Small pieces of iron pyrites and galena are also to be seen in some of the specimens. The slate occurs both in laminations and on the outer edges or wall pieces of the specimens, and in one or two cases filling cavities in the quartz. This slate generally contains iron pyrites, and frequently gold. Cavities which are seen in the slate of several specimens indicates that they were once filled with crystallized iron pyrites.

The depth at which these specimens were taken varies from 20 to 400 feet. The thickness of the different veins varies from 1½ feet to 25 feet. The gold per ton varies from 45 to 203 dwt. per ton, the average being 53 dwt. A number of specimens from Llanelly, in the same district as Dunolly, are much like those just described, with the exception of one, which contains some blende, which occurs in bands of slate which run through the quartz. With the blende are associated gold and iron pyrites. A number of specimens from the Sultan Company's Mine at Blackwood, are composed of quartz banded with blue clay slate, in which gold, iron pyrites, galena, and zinc blende occur. The specimens came from depths varying from 20 to 500 feet.

Specimens from Clunes, some of which were found over 900 feet from the surface, have associated with them the same minerals as are found in those just described. Passing now to the ores found at Sandhurst, some quite important differences in the gold-bearing rocks are noticeable. Many of the specimens have associated with the quartz a black carbonaceous slate in bands or laminations, and also in irregular-shaped cavities in the quartz. In this slate, gold, iron pyrites, galena, arsenical pyrites, and sometimes stibnite are found. Some of these minerals are also found in patches in the quartz itself. One of the specimens from this locality has a thin vein of calcite running through it. These specimens were taken from workings at depths varying from 200 to 740 feet. The thickness of the quartz veins averages from 6 inches to 110 feet. The average amount of gold per ton varies from 4½ dwt. to 120 dwt., the general average of all the mines represented by the specimens being 32 dwt. per ton. Mica is found in a number of specimens from mines at Malden, associated with iron and arsenical pyrites in the granite wall rock. Several of the specimens also have mica sparingly dispersed through the quartz itself.

The Ballarat district, from which the largest amounts of gold is obtained by quartz crushing, is not proportionally represented by illustrative specimens of the different gold-bearing veins. The few specimens which are shown are brought from sinkings, varying from 140 to 850 feet in depth. The quartz in some of the specimens is laminated with dark blue clay slates, which contain gold, iron pyrites, galena, and zinc blende. Other specimens have irregular cavities in the quartz, which are filled with clay slate, sulphide ores, and sometimes gold. The cavities are, occasionally, lined with either crystals of galena or zinc blende with intermingled gold. The yield of gold from the mines which are represented by these specimens ranges from 2 dwt. to 90 dwt. per ton. One specimen, from the Magdala Mine at Slawell, is interesting, as having been obtained at a depth of 1,687 feet below the surface. It is composed of a compact bluish-white translucent quartz, with dark blue slate and prase scattered through it. Thin veins of carbonate of lime also intersect the specimen. The amount of contained gold has not been determined. One feature of the Victorian gold fields, which is very prominently brought out at the Exhibition, is the fact that a considerable number of gold nuggets are found in the alluvial diggings. In the JOURNAL for July 29th, there is a list of nuggets of which there are fac-similes at the Exhibition. Besides those which are included in that list there are a number of models of other nuggets, some of which are not named, and which will be spoken of further on.

The Welcome nugget, which is the largest mass of gold ever found in a natural state, was discovered in a mine at Ballarat, at a depth of 186 feet. Its general shape is rectangular, about 20 inches long, 12 inches wide, and 6 inches deep. On one of its sides there is an angular indentation about 6 inches deep. One of the corners on the other side projects out so as to form a knob about four inches in length. The top surface of the nugget is very rough, being unevenly filled with deep indentations, whose comparatively sharp edges would indicate that it had once been embedded in a quartz matrix.

The Precious nugget which was found at Berlin, and which is not spoken of in the list already given, weighs 1,621 ozs. It is rectangular in shape, with a projection at one end. Its dimensions are about 10 in. by 8 in. by 4 in. Both on top and bottom it is very irregularly formed, having deep indentations, the edges of which are very much rounded off. It was found near the surface under the roots of a tree.

This nugget, as well as several others, is discolored in places by what was probably a thin coating of oxide of iron. A model of a nugget, not named, from Creswick, weighs 32 ozs. In outline, it is in the form of an irregular circle of about three inches diameter, and is perforated in two places by holes. The "Crescent" was found at Berlin, only two feet below the surface. It looks as though it had been made by the knotting up of a round gold bar of varying diameter. The "Needful," weighing 240 ozs., found at Berlin 12 feet below the surface, the "Viscountess Canterbury," weighing 1,105 ozs., from the same place, which was found at a depth of 15 feet, and a number of smaller nuggets are in long rounded masses without indentation. Another case of fac-similes of nuggets, some of which are of considerable size, are not named or labeled in any way. These models do nothing more than represent the large number which have been found in Victoria, many hundred others of the same character having been already found.

A number of theories have been advanced to account for the presence and formation of these nuggets. It is maintained by some that these nuggets are frequently found in such positions on or near the top of deposits of alluvial gold-bearing material when their natural position would be at the bottoms, if they had been originally carried from quartz lodes. Again, these large masses are said to be found at considerable distances from any gold-bearing leads, making it very difficult to understand what force could have been sufficient to carry them over these distances. The gold is also said to be purer that than afforded by the neighboring quartz veins.

The theory held by those who contend for these facts, is that these nuggets have been formed from nuclei of gold, pyrites, or other minerals which have slowly been coated with gold held in solution by meteoric waters, resulting from volcanic action. It was accidentally discovered by Mr. DAINTREE, that a small grain of gold, which was left in a solution of chloride of gold, had, in several days, considerably increased in size, the deposition of gold from the solution having been brought about by the reducing action of a small piece of cork, which had fallen into the liquid. Other experiments have proved that gold will be deposited from its solution, by the action of organic matter upon such substances, as pyrites, quartz, etc.

Those who hold that the large nuggets have been slowly formed in this manner, claim that there is a strong indirect confirmation of their views in the fact that large nuggets are found on the sides of the ranges to the west of Ballarat, which have been subjected to much volcanic action, this being the means by which the auriferous waters are supposed to have been formed. The gold-bearing country to the east of these ranges, which has not been much subject to volcanic action, contains but few nuggets, and these very small in size.

Those who oppose this theory claim that there is no evidence that these auriferous waters have ever existed. They take the view that the nuggets have either been formed by the melting together of many small gold grains by volcanic heat, or that they are simply large masses of gold which have been worn out of quartz rocks in which they were embedded. The theory with regard to the action of volcanic heat in melting small masses together seems untenable, as the larger number of nuggets have been found in places where volcanic action has not taken place, and also because this action could not have occurred in the alluvia where the nuggets are found.

In support of the theory that these large masses were originally embedded in quartz reefs, it is cited that one of the largest and purest masses yet found, was in position over a quartz reef, and bore marks of having been, at one time, a part of it. The quality of the gold found in these masses, and in the quartz veins, is also claimed to be the same, an opinion at variance with that held by those who believe in the formation by solution. The fact that the gold in the quartz veins grows, as a rule, finer as the vein descends, is advanced to explain why such large masses are not found at present in quartz. These large masses having been embedded in the tops of the veins before any denudation had taken place. Careful examination of many nuggets has resulted in the discovery of cavities such as would have been left by quartz crystals, or similar to those seen on masses which have been detached from quartz rock.

Crystals of gold are not unfrequently found in the different Victorian gold districts. The districts of Ballarat, Bendigo, and Castlemaine, have produced the lager part of those yet found. The crystals are in cubical and octahedral forms, and give evidence on examination, according to the report made on them in 1866 by the Colonial Mineralogist, of having been formed from small nuclei of foreign material.

TO BE CONTINUED.

THE GREAT OIL PIPE.—The Pennsylvania Transportation Company consummated contracts, August 11, with the Pipe Manufacturers' Association for three hundred miles of pipe. Operations will commence immediately, and the line to the seaboard completed before the first of December. The engineers of the line are now receiving bids for pumps and boilers. The route is definitely located, and bonds are being taken rapidly at par.

THE SAN JUAN MINES.

Special Correspondence of the Engineering and Mining Journal.

ALTHOUGH the press of the country for the past several years has been full of accounts of the richness of the San Juan Mines, still it seems impossible to do the subject justice, and the more one sees of the mines the more there seems to be to tell. For that reason I hope your many readers will pardon this communication if it should seem to them to be superfluous.

The San Juan Mines are located in South-western Colorado, and in the counties of Hinsdale, Rio Grande, La Plata, and San Juan. They extend over a space of country 150 miles long (east and west) by about 80 miles wide (north and south). The country is extremely mountainous, more so than in any other portion of Colorado, and, unlike other portions, the mountains rise very abruptly from the valleys, towering up in an unbroken mass, 4,000 to 5,000 feet above the valleys. The extreme ruggedness and height of the mountains make the country very inaccessible, and that is probably the reason why it has been unknown and unexplored for so long a time. The first white men came here in 1860 and 1861. They consisted of a party in charge of Captain JOHN BAKER. They had heard fabulous reports from Mexicans and Indians of rich placer mines in South-western Colorado, and in their prospecting trips came into this country. Rich prospects were found, but, on account of the large number of boulders in the streams, it was found unprofitable to work the ground. They came out, reporting a rough, inaccessible country, but one whose mountains were filled with quartz veins. The country was unheard of again until 1870, when a party of three miners came into Santa Fé with some elegant specimens of gold quartz, that they said they had found near the head of the Rio Grande del Norte. The specimens were from the famous Little Giant Mine, and created such an excitement that in 1871 several men came in here. Since then the population has been yearly increasing, until now there are nearly 5,000 men working mines in this section.

The country is the most peculiar known, and has, on its face, more of the characteristics of a mining country than any I have ever seen. The mountains, very high, are nearly entirely destitute of vegetation, and through the barren cliffs may be seen thousands (I am not exaggerating) of veins and crevices, intersecting each other, and forming a perfect network of lodes. Here and there may be seen a large vein 50 to 60 feet wide, running like a huge wall over the mountains, and extending as far as the eye can reach. Prospecting is thus made extremely easy, and consists of simply going to a cropping, knocking off a piece of rock, and, if it suits, the claim is worked, if it does not suit, the prospector goes on to another lode. Some surface rock assays very high, away up into the thousands of dollars to the ton, and there are many lodes that have paid from the moment work was commenced on them. I know of one mine, where $18,000 was taken out of a shaft 4 feet by 4 feet and 12 feet deep, and the owners to-day are taking a fortune out of it. Fourteen assays were made from *surface rock* of another claim; the highest assay was $7,013; the average of the fourteen was 1867. Assays from surface rock have reached as high as $34,000, and hundreds of lodes have assayed upwards of $1,000. There are, probably, 50 mines to-day that are paying for the working of them, and there would, probably, be several times that number worked and paying, if the reducing works were of sufficient capacity. What has been said may appear fabulous to some, but it is a simple fact. I have never seen in any mining camp such prominent lodes or such rich surface indications, and for the small amount of development (no lode having been sunk on to a greater depth than 125 feet), such promising mines.

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for the last few months in large numbers, studying our natural resources and the arts connected with their development.

The first part of the book, however, is evidently intended for domestic consumption; and we wish it had been issued as a separate volume, so that we could present the second part, without it, to gentlemen who did not wish to be insulted, or care to be amused by the style of Mr. SWANK's argument for protection. In his introductory letter he says:

"Good men of all parties, and the young men of our country, who are not educated in our free-trade colleges, are hungry for facts which prove the correctness of the proposition, that protection is a blessing and the fountain of blessings to the country that adopts it and steadily adheres to it; and I have felt that no better service could be rendered to the cause of protection, than to present, in popular form, as many of these facts as could be conveniently compressed into a small but not too narrow compass.

"In examining the policy of protection in the light of undoubted facts, I have found it to be impossible to ignore the industrial example of Great Britain, and much against my inclination, I have commented upon it at some length. If the manufacturers and merchants of that country did not steadily pursue the policy of ungenerous and offensive interference with the domestic affairs of other countries; if they did not send emissaries to this country to corrupt our press and debauch our legislators in the interest of so-called free trade, which benefits them and is an injury to us; if they had not, within the past year, organized their Iron Trade Association, avowedly to secure, where possible, a modification of all foreign tariffs that the British iron trade may be strengthened, and the iron industry of other countries may be destroyed, it would not have been necessary in this report to show the weak side of British commercial character, and the sad results to British workingmen of British efforts to monopolize the world's important manufactures."

This nauseous stuff about "British emissaries" (we are glad to note, by the way, that "British gold" has been handed over as stock in trade to Senator JONES; and we trust it will not turn up again in Mr. SWANK's writings), is a pitiable product for an American pen, in a "Centennial Year." It is just the strain which used to be piped by the advocates of slavery. In those days everything would have been lovely, but for "British emissaries of abolition." In the name of a free press and a land of free speech, we welcome all emissaries of any doctrine to the open discussion of it. Truth has nothing to fear; and true manliness will not whine over fair discussion, or brand as "debauchers" and "corruptors" the honest advocates of differing views. Of course we know that Mr. SWANK's complaint is largely Pickwickian, like the celebrated speeches of Mr. WHARTON, to which it bears a suspicious resemblance. Personally, he likes the "emissaries" very much; gives them compliments, and facts, and dinners; avoids discourteous attacks upon them (usually) while they are his guests; and, doubtless, as he bids them *bon voyage* to their native clime of oppression and misery, slips this memorial volume into their hands, with the hint that certain passages are not intended for *them*. But how does that help the case? If to complain seriously of free debate is pusillanimous, how much better is he who pretends a cowardice he does not feel?

When we come to examine Mr. SWANK's argument, we find it indeed a collection in small compass of nearly everything that can be said in favor of a certain theory of protection—a collection, indeed, so comprehensive that the parts do not fit together. We are even left to gather by inference what is meant by protection. Since it is "not incompatible with revenue," it is apparently not prohibitory; yet the logic of many arguments advanced goes straight to the point of prohibition; and remembering the wails of the *Bulletin* over the small residuum of foreign special brands of iron imported into this country, we feel quite certain that Mr. SWANK does want a prohibitory tariff on iron. Again, we are not told on what principle protection is to be granted. The logic of the arguments advanced goes to the protection of all industries to the point of prohibition. And yet there is a lurking sense in the reader's mind, that with due courtesy toward wool, and silk, and salt, etc., Mr. SWANK thinks chiefly of iron. Most confusing of all, there are a large number of earnest arguments which apply, in the present state of the iron business particularly, to the protection of one part of this country against another; and here we fancy that though the hand is the hand of SWANK, the voice is the voice of Pennsylvania.

Is there no point, then, short of such absurdities and incoherencies? Must every protectionist talk like a lunatic? We think the reader of Mr. SWANK's edition of WHARTON will conclude with us that his sad blunders come from an attempt to claim and prove what is at once too much and too little, summed up in his fundamental proposition that "protection is a principle, not an expedient." This means (if it means anything) that protection should be given at all times, under all circumstances, to all domestic industries—that it is always needed and always good. The fact is just the opposite. Protection is sometimes needed, and sometimes not; in some cases a benefit to the country, in some cases not; in some degrees wise, when, in larger degree, it might be unwise. The duty is sometimes paid by the consumer, sometimes by the producer; it sometimes increases, and sometimes diminishes production or price; in a word, everything that Mr. SWANK propounds on the subject is true or not true, according to circumstances of which he takes no account. Every individual demand for protection is a problem in statesmanship by itself. The general tendency of thinking men may or may not be toward free trade; for that we do not care at present. Sensible people know very well that the United States will continue to have a tariff. The great labor before us is the proper adjustment, and perpetual, yet not fitful and wanton, readjustment of that tariff, in such accordance as poor human wisdom can command, with the needs of the country and the courses of trade. Light on that problem, and on each of its complicated elements, is most welcome; but war-whoops against Great Britain, and clumsy ascriptions of all her social evils to free trade and all our blessings to the opposite policy, are simple superfluity. Least of all does it become philosophers, whose pecuniary interest in their own theories is so openly avowed, to attack the motives of their opponents as selfish and narrow. Mr. SWANK does not represent the science of political economy; he represents a society of worthy ironmasters, principally of Pennsylvania, who are trying in this way (exactly how, we presume they do not themselves understand) to "revive the iron trade." Many of them, for the same reason, want soft money, interconvertible bonds, and other political cathartics, to start internal activity.

We should be quite content to see them pursue their way, spending their own money (not British gold, of course) in this sort of agitation, but for our earnest sympathy with them in their object, greatly as we differ concerning the means. Having this sympathy (for we depend as directly upon the mining and metallurgical industries for our support as do the miners and manufacturers themselves) we regret that the tendency to run for legislation as the remedy in all troubles of the trade should have gained such control over the Iron and Steel Association. Here is the iron business, sick to death of home competition and over-production, and far beyond help from any kind of a tariff—and Mr. SWANK and his assistants preaching over the patient their untimely abuse of other schools of medicine and empty praises of their own! However, that will do little harm beyond delaying recovery. The greater evil which we fear is the reaction in the popular mind against even reasonable and seasonable protection, which may be the result of all this ill-timed and reckless outcry. The time has been when the iron business needed the maintenance, or the increase, of protective duties. It may come again; it is certainly not here at present. But it is one of the standing arguments against protection that the young and imperiled interests which receive it become greedy as they grow strong, and stretch their demands beyond their needs. This argument has truth in it. It is qualitatively though not quantitatively effective; that is to say, there is a real peril of this kind, yet that peril should not prevent the wise nurture of varied industries by appropriate legislation. But people who belong to industries not protected may fail to reason calmly on the matter; and there is great danger that in a grand reaction against "grasping monopolists," etc., etc., the just claims of the iron trade, for example, may be wholly denied. Common sense suggests that this trade, like every other, should ask for nothing that it does not really need. As for the policy of seizing upon a time when the question is practically dead, to utter the most extravagant propositions concerning it, it is as foolish as the choice of the "Centennial Year" for an anti-foreign tirade is *malapropos*. *

WURTZ'S GEOMETRICAL CHEMISTRY.

PROF. WURTZ has published in pamphlet form his *Geometrical Chemistry: First or Introductory Memoir*, printed in the *American Chemist* last March, and partly reprinted in our columns subsequently. We have spent some time in the study of it, without being able to determine how much value should be given to the numerical coincidences upon which Prof. WURTZ's theories are based. We feel quite certain that he goes too far in attempting to bring into accord with his hypothesis many natural mineral species, of which it is well known that they are varied in chemical constitution by isomorphism and by accidental constituents far too widely to be good evidence as to any law of atomic volume. Prof. WURTZ would have gained much by stating his case with greater simplicity and clearness and keeping his conclusions, his triumph, his poetry, and his universal applications altogether apart from his facts. It is undeniable that his memoir is obscure. Nevertheless, we think the relations he has discovered exist, though they may not mean what he thinks they do.

Prof. GUSTAVUS HINRICHS, of the Iowa State University, in the last number of the *Popular Science Monthly*, attacks this memoir with considerable acuteness, and more bitterness. It is a great pity that Prof. HINRICHS, who is a good chemist and mathematician, should seem so utterly ignorant of the manner in which discussion should be carried on with courtesy. We should have been very glad indeed to see a candid and kindly review of this subject from his pen; we feel that there is force in his characterization of such handling of figures as "indeterminate analysis;" but there is neither force nor good taste in his savage attack on Professor WURTZ. That gentleman, though he may indeed deceive himself as to the importance of his calculations, or fall into errors which careful critics can expose, is neither a charlatan nor an idiot, but a chemist of acknowledged skill and a sincere and conscientious worker. Prof. HINRICHS should have learned a different tone from the recollection that his own peculiar theories of "atomechanics" have been suspected (we do not say justly) of resting upon vague coincidences and "indeterminate analysis;" that his views of crystallography are particularly heterodox; and finally, that he has had occasion to complain more than once of the treatment he has received from scientific men. We tell him frankly that such ferocious criticism as he has just perpetrated will make everybody think he is trying to gratify some private grudge—everybody, that is, who does not know him. We, who do know him, are well aware that the article in the *Popular Science Monthly*, though it doubtless represents his honest opinion, *mis*represents his kindly heart. *

IMPROVED ZINC WHITE.—The liquor from washing crude barium sulphide is mixed with equal parts of zinc chloride and sulphate. The precipitate is pressed and dried, then heated, and thrown, when hot, into cold water. The resulting powder is of superior quality.—*American Chemist.*

GOLD EXHIBITS AT THE PHILADELPHIA EXHIBITION.—II.

Special Correspondence of the Engineering and Mining Journal.

VICTORIA, AUSTRALIA, (*continued from page* 136).

SPECIMENS from nine gold-bearing quartz veins at Dunolly are exhibited in the Victoria mineral display. They do not vary much in character, nearly all being composed of bluish-white amorphous quartz, containing generally more or less blue slate. Imbedded in the quartz fine gold is frequently seen. Small pieces of iron pyrites and galena are also to be seen in some of the specimens.

The slate occurs both in laminations and on the outer edges or wall pieces of the specimens, and in one or two cases filling cav ties in the quartz. This slate generally contains iron pyrites, and frequently gold. Cavities which are seen in the slate of several specimens indicates that they were once filled with crystallized iron pyrites.

The depth at which these specimens were taken varies from 20 to 400 feet. The thickness of the different veins varies from 1½ feet to 25 feet. The gold per ton varies from 45 to 203 dwt. per ton, the average being 53 dwt. A number of specimens from Llanelly, in the same district as Dunolly, are much like those just described, with the exception of one, which contains some blende, which occurs in bands of slate which run through the quartz. With the blende are associated gold and iron pyrites. A number of specimens from the Sultan Company's Mine at Blackwood, are composed of quartz banded with blue clay slate, in which gold, iron pyrites, galena, and zinc blende occur. The specimens came from depths varying from 20 to 500 feet.

Specimens from Clunes, some of which were found over 900 feet from the surface, have associated with them the same minerals as are found in those just described. Passing now to the ores found at Sandhurst, some quite important differences in the gold-bearing rocks are noticeable. Many of the specimens have associated with the quartz a black carbonaceous slate in bands or laminations, and also in irregular-shaped cavities in the quartz. In this slate, gold, iron pyrites, galena, arsenical pyrites, and sometimes stibnite are found. Some of these minerals are also found in patches in the quartz itself. One of the specimens from this locality has a thin vein of calcite running through it. These specimens were taken from workings at depths varying from 200 to 740 feet. The thickness of the qua tz veins averages from 6 inches to 110 feet. The average amount of gold per ton varies from 4½ dwt. to 120 dwt., the general average of all the mines represented by the specimens being 32 dwt. per ton. Mica is found in a number of specimens from mines at Malden, associated with iron and arsenical pyrites in the granite wall rock. Several of the specimens also have mica sparingly dispersed through the quartz itself.

The Ballarat district, from which the largest amounts of gold is obtained by quartz crushing, is not proportionally represented by illustrative specimens of the different gold-bearing veins. The few specimens which are shown are brought from sinkings, varying from 140 to 850 feet in depth. The quartz in some of the specimens is laminated with dark blue clay slates, which contain gold, iron pyrites, galena, and zinc blende. Other specimens have irregular cavities in the quartz, which are filled with clay slate, sulphide ores, and sometimes gold. The cavities are, occasionally, lined with either crystals of galena or zinc blende with intermingled gold. The yield of gold from the mines which are represented by these specimens ranges from 2 dwt. to 90 dwt. per ton. One specimen, from the Magdala Mine at Slawell, is interesting, as having been obtained at a depth of 1,687 feet below the surface. It is composed of a compact bluish-white translucent quartz, with dark blue slate and prase scattered through it. Thin veins of carbonate of lime also intersect the specimen. The amount of contained gold has not been determined. One feature of the Victorian gold fields, which is very prominently brought out at the Exhibition, is the fact that a considerable number of gold nuggets are found in the alluvial diggings. In the JOURNAL for July 29th, there is a list of nuggets of which there are fac-similes at the Exhibition. Besides those which are included in that list there are a number of models of other nuggets, some of which are not named, and which will be spoken of further on.

The Welcome nugget, which is the largest mass of gold ever found in a natural state, was discovered in a mine at Ballarat, at a depth of 186 feet. Its general shape is rectangular, about 20 inches long, 12 inches wide, and 6 inches deep. On one of its sides there is an angular indentation about 6 inches deep. One of the corners on the other side projects out so as to form a knob about four inches in length. The top surface of the nugget is very rough, being unevenly filled with deep indentations, whose comparatively sharp edges would indicate that it had once been embedded in a quartz matrix.

The Precious nugget which was found at Berlin, and which is not spoken of in the list already given, weighs 1,621 ozs. It is rectangular in shape, with a projection at one end. Its dimensions are about 10 in. by 8 in. by 4 in. Both on top and bottom it is very irregularly formed, having deep indentations, the edges of which are very much rounded off. It was found near the surface under the roots of a tree.

This nugget, as well as several others, is discolored in places by what was probably a thin coating of oxide of iron. A model of a nugget, not named, from Creswick, weighs 32 ozs. In outline, it is in the form of an irregular circle of about three inches diameter, and is perforated in two places by holes. The "Crescent" was found at Berlin, only two feet below the surface. It looks as though it had been made by the knotting up of a round gold bar of varying diameter. The "Needful," weighing 240 ozs., found at Berlin 12 feet below the surface, the "Viscountess Canterbury," weighing 1,105 ozs., from the same place, which was found at a depth of 15 feet, and a number of smaller nuggets are in long rounded masses without indentation. Another case of fac-similes of nuggets, some of which are of considerable size, are not named or labeled in any way. These models do nothing more than represent the large number which have been found in Victoria, many hundred others of the same character having been already found.

A number of theories have been advanced to account for the presence and formation of these nuggets. It is maintained by some that these nuggets are frequently found in such positions on or near the top of deposits of alluvial gold-bearing material when their natural position would be at the bottoms, if they had been originally carried from quartz lodes. Again, these large masses are said to be found at considerable distances from any gold-bearing leads, making it very difficult to understand what force could have been sufficient to carry them over these distances. The gold is also said to be purer that than afforded by the neighboring quartz veins.

The theory held by those who contend for these facts, is that these nuggets have been formed from nuclei of gold, pyrites, or other minerals which have slowly been coated with gold held in solution by meteoric waters, resulting from volcanic action. It was accidentally discovered by Mr. DAINTREE, that a small grain of gold, which was left in a solution of chloride of gold, had, in several days, considerably increased in size, the deposition of gold from the solution having been brought about by the reducing action of a small piece of cork, which had fallen into the liquid. Other experiments have proved that gold will be deposited from its solution, by the action of organic matter upon such substances, as pyrites, quartz, etc.

Those who hold that the large nuggets have been slowly formed in this manner, claim that there is a strong indirect confirmation of their views in the fact that large nuggets are found on the sides of the ranges to the west of Ballarat, which have been subjected to much volcanic action, this being the means by which the auriferous waters are supposed to have been formed. The gold-bearing country to the east of these ranges, which has not been much subject to volcanic action, contains but few nuggets, and these very small in size.

Those who oppose this theory claim that there is no evidence that these auriferous waters have ever existed. They take the view that the nuggets have either been formed by the melting together of many small gold grains by volcanic heat, or that they are simply large masses of gold which have been worn out of quartz rocks in which they were embedded. The theory with regard to the action of volcanic heat in melting small masses together seems untenable, as the larger number of nuggets have been found in places where volcanic action has not taken place. and also because this action could not have occurred in the alluvia where the nuggets are found.

In support of the theory that these large masses were originally embedded in quartz reefs, it is cited that one of the largest and purest masses yet found, was in position over a quartz reef, and bore marks of having been, at one time, a part of it. The quality of the gold found in these masses, and in the quartz veins, is also claimed to be the same, an opinion at variance with that held by those who believe in the formation by solution. The fact that the gold in the quartz veins grows, as a rule, finer as the vein descends, is advanced to explain why such large masses are not found at present in quartz. These large masses having been embedded in the tops of the veins before any denudation had taken place. Careful examination of many nuggets has resulted in the discovery of cavities such as would have been left by quartz crystals, or similar to those seen on masses which have been detached from quartz rock.

Crystals of gold are not unfrequently found in the different Victorian gold districts. The districts of Ballarat, Bendigo, and Castlemaine, have produced the lager part of those yet found. The crystals are in cubical and octahedral forms, and give evidence on examination, according to the report made on them in 1866 by the Colonial Mineralogist, of having been formed from small nuclei of foreign material.

TO BE CONTINUED.

THE GREAT OIL PIPE.—The Pennsylvania Transportation Company consummated contracts, August 11, with the Pipe Manufacturers' Association for three hundred miles of pipe. Operations will commence immediately, and the line to the seaboard completed before the first of December. The engineers of the line are now receiving bids for pumps and boilers. The route is definitely located, and bonds are being taken rapidly at par.

THE SAN JUAN MINES.

Special Correspondence of the Engineering and Mining Journal.

ALTHOUGH the press of the country for the past several years has been full of accounts of the richness of the San Juan Mines, still it seems impossible to do the subject justice, and the more one sees of the mines the more there seems to be to tell. For that reason I hope your many readers will pardon this communication if it should seem to them to be superfluous.

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The country is the most peculiar known, and has, on its face, more of the characteristics of a mining country than any I have ever seen. The mountains, very high, are nearly entirely destitute of vegetation, and through the barren cliffs may be seen thousands (I am not exaggerating) of veins and crevices, intersecting each other, and forming a perfect network of lodes. Here and there may be seen a large vein 50 to 60 feet wide, running like a huge wall over the mountains, and extending as far as the eye can reach. Prospecting is thus made extremely easy, and consists of simply going to a cropping, knocking off a piece of rock, and, if it suits, the claim is worked, if it does not suit, the prospector goes on to another lode. Some surface rock assays very high, away up into the thousands of dollars to the ton, and there are many lodes that have paid from the moment work was commenced on them. I know of one mine, where $18,000 was taken out of a shaft 4 feet by 4 feet and 12 feet deep, and the owners to-day are taking a fortune out of it. Fourteen assays were made from *surface rock* of another claim; the highest assay was $7,013; the average of the fourteen was 1867. Assays from surface rock have reached as high as $34,000, and hundreds of lodes have assayed upwards of $1,000. There are, probably, 50 mines to-day that are paying for the working of them, and there would, probably, be several times that number worked and paying, if the reducing works were of sufficient capacity. What has been said may appear fabulous to some, but it is a simple fact. I have never seen in any mining camp such prominent lodes or such rich surface indications, and for the small amount of development (no lode having been sunk on to a greater depth than 125 feet), such promising mines.

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rapid development of the country. But I know of no place where the large amount of capital lying idle in the Eastern States could be invested to better advantage than in this country, and I know of nothing that would yield a larger amount to the sum invested. Capital is the great demand of the country, and is the only thing needed in the country. D.

EUREKA, SAN JUAN CO., COL., August 6, 1876.

THE SILVER LEAD MINES OF UTAH.*

Special Correspondence of the Engineering and Mining Journal.

BEDDED VEINS.

UNDER this caption I propose to describe a class of mines, which, while it does not comprise all the silver lead mines of the Territory, is the most important in extent and value. I refer to the so-called strata or bedded veins. In all these mines, so far as my examinations have extended, there is entirely wanting the vein structure of definite walls, gangue, and the usual parting or clay gauge, found in the strata veins of other countries, nor do the ore deposits spread out into long ribbon-like veins, but occur chiefly as pipes, stockworks, strings of ore and bonanzas more or less connected in a definite direction through a mass of broken country rock. The deposits occur usually in the neighborhood of cross breaks or places at which two breaks in the country intersect each other, or where an older mine is crossed by one of later origin. As at the top of the Mono shaft the ore pipe commences at the surface upon the junction of an older cross break and has filled it with rich ores for a short distance below the foot wall of the ore pipe proper, and at the discovery shaft of the Flagstaff Mine the junction of an older cross fissure is the point at which the largest deposits of ore have been found. The Mono Mine consists of a pipe of very rich ore, varying from ten to over one hundred feet in length, and has been followed to a depth (upon its dip) of over 600 feet. The so-called Chicago Mine is also a pipe of ore having no lateral expansion, and is generally as wide as it is long. The Hidden Treasure Mine in the same district is also an ore pipe, but much more extensive than the Mono at the time I last saw it. The pipe had been followed to a depth of over 1,000 feet and then showed a body of galena ore measuring twenty-five feet in thickness at the bottom of the incline and extending as far as the works had been driven (about 70 feet in length). The Old Telegraph Mine in Bingham Cañon is one of the Stockwerk veins, the largest of the ore deposits had an extent of about 80 feet in length by 36 feet in extreme height, the ore for more than 20 feet of this height being solid galena. The dip of this deposit being about 20° from the horizon it is not yet known how far it may extend towards the deep. The Flagstaff Mine in Little Cottonwood District may be taken as a representative of the "Bonanza" class of mines, the ore occurring in large segregated masses inclosed in a mass of broken country rock and connected throughout by small strings or pipes of ore. I think the largest deposit found in this mine was about 300 feet in depth by 200 in length and about 20 feet in the widest portions. The mines I have mentioned may be taken as the representatives of the majority of the mines in their respective districts, not true veins. As to the beds in which those mines occur; it seems that when a bed of the country rock, originally softer and more friable than the mass of the mountain with which it has been upheaved, has been extensively broken and crushed by the movement of the other beds upon it during the process of upheaval, the mineral solutions afterwards coming from the deep interior of the earth have found the line of least resistance to their escape through the broken mass of these strata of country rock, the fragmentary condition of those beds affording the best opportunities for chemical reactions. These Thermal mineral waters, probably highly charged with acid reagents, have reacted upon the rocks through which they have flowed, decomposing and taking up those portions of the country rock most easily dissolved and depositing the mineral contents of the waters instead. The duration of the period of deposition was undoubtedly great, as the amount of material removed, taken into consideration with the slowness of natural chemical changes, would suggest a period of great length even in geological times. We assume that to this cause alone can we attribute the formation of the cavities occupied by ore chambers, and the contemporaneous deposition of the ores they contain—and in no case that I have examined can we attribute the formation of the ore chambers to the forcing apart of the walls either by crystallization or by plutonic force. The source of the ores, then—(having seen that the ore deposits do not occupy veins or fissures in the rocks) — becomes a natural and pertinent question. The geologist, studying the geognosy of the mineral districts of Utah, will have impressed upon his attention the fact that the ore deposits were formed subsequently to the upheaval of the mountain ranges in which they occur, and further examination will lead him to the conviction that the series of occurrences were, 1st. The slow uplift of the mountains. 2d. The intrusion of the dykes of granite, porphyry, and trachyte. 3d. The deposition of the ores from mineral solutions flowing from the seat of igneous action. Following this line of reasoning, he will find the evidences in support increasing at every step. He will find that ores are found only in districts traversed by dykes of igneous rock, that the dykes have cut the stratified beds after they had assumed their present positions and that the dykes are in the main undisturbed and unbroken. He will find in Dry Cañon, Ophir, and Camp Floyd the mines all ranged upon the west side of the main dyke of porphyry, and nearly without exception dipping easterly or towards the dyke. In Bingham Cañon the immense dyke of hornblende porphyry above Highland contains numerous rich veins, and at the Nez Perces Mine he will find that, though the mine is bedded in quartzite, it dips at a low angle towards a large dyke of hornblende porphyry. In Little Cottonwood the Grizzly Mine is a vein lying in contact with a dyke of compact felsite. The Lion and Darlington Mines at the surface were found in granular limestone, but in depth are, like the Grizzly, in contact with porphyry and lime. The Utah Mine occupies the fissure of a dyke of porphyry. From these and many other instances, he will be assured that the ore formations are more recent than the intrusive rocks, and from the impregnations contained in the matter of the dykes themselves he will see that the mineral solutions followed the fissures of the dykes or that sublimations coming from the interior of the earth have made their escape through the dyke fissure. Then if he finds one of these crushed beds of sandstone, granular limestone, or arenaceous shale, dipping towards and traversed upon its strike by one of those igneous dykes, and further finds that this crushed bed contains deposits of ore of irregular form and extent, and which does not appear to have been derived from any regular source, the conclusion seems inevitable that the ore deposits were formed by precipitation from mineral waters, which first derived their metallic contents from sublimations coming from the deep interior of the earth, through the fissure of the igneous dyke. This is the condition of every one of these so-called bedded or strata veins that I have examined in this Territory. They occupy broken or crushed strata of rocks, and are formed, not by precipitation from above, nor by igneous injection, nor by infiltration from the surrounding rocks, but by mineral solutions coming from the deep interior of the earth through the fissures of the igneous dykes or breaks in the country rocks in close proximity to the dykes. These semi-irregular ore deposits do not give out when the dykes are encountered, but change their direction, and follow the dyke fissure to the deep — at least this has been our experience so far.

SALT LAKE CITY, August 9th, 1876. M.

* The Mines mentioned in this paper have been classed as bedded or contact veins by experts who have reported upon them.

KANAWHA COAL MINING NOTES.

Special Correspondence of the Engineering and Mining Journal.

THE coal trade throughout the valley is very much depressed, and there is but little to write you in regard to the different mines.

At *Kuttallsburg* the runs have been fair since the middle of July.

Gauley Kanawha Company, now idle. Some surveys have been made for a new route to the line of the C. & O. RR., but as yet no plan has been decided upon. There is every prospect of the English stockholders of this company becoming disgusted with the non-fulfilment of the promises made them when the company was organized. There is not even a very distant view of dividends to encourage them.

Cannelton.—There has been some trouble with the miners here, and both the cannel and splint banks are closed for the present. It is understood, however, that work will be resumed within a month or six weeks.

Coal Valley has been running steadily all Summer.

Stranghus and *Upper Creek Company* idle the larger part of the season, and only running to fill occasional orders.

Enterprise.—The miners are out on a strike, and it is probable that the company will not endeavor to make terms with them until there is more water in the Kanawha River at their tipple.

Paint Creek.—Very little work here since last Spring. A road is being built to the Kanawha River, and runs through the Fall and Winter, promise to be more regular than heretofore.

Blacksburg.—Work was resumed on the 21st of this month, and with orders ahead there will be no break in the runs for several months.

Ault's.—Running about four days in the week, but the output is not large.

Coalburg.—No shipments West have been made from here since June 30th, and very little has gone East. Working not more than quarter time.

Cedar Grove.—Running to fill orders for local trade. A small shipment was made last week to Cincinnati, with a view of having the coal tested for gas purposes.

Cadmont.—Men striking for a reduction in prices of goods, and fuller stock in company's store.

Lewiston.—No shipments West since last Spring. Running about three days in the week for railroad trade, which is lighter than usual, even in very dull seasons.

Campbell's Creek has been stopped for some time. Changes are being made in the tipple, and men are driving the entries ahead, in anticipation of brisk work this coming Fall.

Pioneer.—Shipments from here have averaged nearly 10,000 bushels per day for several months.

Raymond City.—No work going on at all.

Peyton.—Idle now, but preparing to start shortly.

New mines are being opened by Messrs. STUART M. BUCK & Co., on property adjoining Coalburg, and the first coal will be loaded by November 15th. This is the only new work on the river now in progress.

BLAST FURNACE STATISTICS.*

By John A. Church, E. M., Tarrytown, N. Y.

IN the year 1874, when the price of pig iron was still high, that staple product became the subject of discussion in the newspapers and among those philosophers who are determined to know the "reason why" for all things. The object of the inquiry was to find out why iron did not fall in price, as much as some other things had fallen. Indeed, there seemed to be an impression that iron and gold ought to move on nearly parallel lines, for the fact was constantly brought forward that iron then cost twice as much as it did before the war, though gold had returned to within twelve or fifteen per cent. of its former value. After some time the papers, by what seemed to be nearly unanimous consent, reached the conclusion that the maintenance of high prices was the work of the furnace proprietors, who, as the result of their shrewdness, were pocketing enormous profits. No proof was given to support this opinion, and the figures of cost and sale that were produced were of the most general kind, and used in the most vague manner.

Visiting the President of the Thomas Iron Company, whose great works at Hokendaqua and Catasauqua, in Pennsylvania, are so well known as the largest and among the best conducted in America, I found him quite willing to meet the vague suspicions of the newspaper wiseacres, by a publication of the figures contained in the furnace books of his company. These were accordingly given to the world through the ENGINEERING AND MINING JOURNAL, and attracted the general attention they so well deserve. Though my own name became connected with these statistics, from the fact that I used them as the basis for the first attempt ever made to calculate the furnace economy of an American works, I can, without the suspicion of egotism, say that the statistics referred to, are the most valuable contribution the literature of American blast furnace work has yet received, for their interest is independent of personal considerations, and due entirely to the fact that they represent faithfully the details of practice in one of the most prominent American works. They are an exact transcript of the furnace books, and form a body of accurate information of the greatest value to the metallurgical student. Their importance is shown by the fact that though the theoretical conclusions which I based upon them have been several times attacked, not one of my critics has made the slightest contribution to statistics of blast furnace practice. My table was unique, and unless the managers of other works are equally spirited, it is likely to remain so.

Believing that statistics of such value should be formally laid before this Institute, and embodied in its Transactions, I obtained from the President of the company a transcript of his books for the two years which have elapsed since my publication, and the whole is now presented to you in the following table:

* A paper read before the American Institute of Mining Engineers, at the Washington Meeting, February, 1876.

Six Months, ending	Cost per Ton.			Amount used per Ton Pig.						Cost per Ton Pig.				Total cost per ton pig.	Tons pig made in six months.	Running time.		Quality. Average No.
	Coal.	Ore.	Lime-stone.	Coal.		Ore.		Limestone.		Coal.	Ore.	Lime-stone.	Labor and Repairs.			Weeks.	Days.	
				T.	Lb.	Tons.	Lb.	Tons.	Lb.									
December, 1855	$3 10	$3 59	$0 63	2	968	2	1,252	1	1,357	$7 55	$9 50	$0 98	$2 54	$20 57	6,445	39	5	1·61
June, 1856	2 95	3 75	0 57	2	835	2	1,353	1	834	7 00	9 61	0 78	3 08	20 47	10,608	52	5	1·67
December, "	2 89	3 65	0 54	2	560	2	892	1	976	6 50	8 75	0 78	5 94	21 97	6,838	40	0	1·77
June, 1857	2 84	3 69	0 52	2	465	2	858	1	630	6 27	8 34	0 67	4 68	19 37	10,534	51	5	1·53
December, "	2 80	3 30	0 52	2	336	2	804	1	537	6 02	7 72	0 65	4 23	18 61	7,564	39	5	1·66
June, 1858	2 54	2 88	0 43	2	11	2	813	1	544	5 09	6 68	0 54	3 49	15 80	7,732	32	4	1·93
December, "	2 43	2 81	0 37	1	2,175	2	566	1	699	4 80	6 33	0 48	2 55	14 16	12,256	52	2	1·79
June, 1859	2 42	2 62	0 34	2	161	2	701	1	733	5 02	6 06	0 46	2 85	14 39	11,767	49	2	1·86
December, "	2 39	2 61	0 34	2	170	2	870	1	500	4 97	6 23	0 41	4 29	15 91	10,429	52	0	1·86
June, 1860	2 44	2 60	0 35	1	2 056	2	885	1	778	4 68	6 23	0 47	4 13	15 50	11,155	46	0	1·96
December, "	2 45	2 86	0 36	1	1 949	2	633	1	655	4 58	4 58	0 46	2 46	14 02	13,699	52	1	1·98
June, 1861	2 37	2 70	0 34	1	2,218	2	685	1	854	4 72	4 72	0 47	2 58	14 00	13,219	51	5	2·05
December, "	2 36	2 62	0 33	2	85	2	627	1	789	4 82	4 82	0 44	2 34	13 58	13,777	52	2	2·06
June, 1862	2 37	2 39	0 34	2	56	2	531	1	824	4 79	4 79	0 47	2 45	13 05	12,784	52	0	2·01
December, "	2 70	2 63	0 32	2	323	2	363	1	567	5 80	5 80	0 41	2 11	14 01	17,902	77	5	1·61
June, 1863	3 80	2 60	0 45	2	224	2	676	1	737	7 99	6 00	0 60	4 45	19 03	16,968	72	1	2·09
December, "	4 92	3 03	0 49	2	579	2	909	1	978	11 11	7 29	0 71	4 94	24 05	18,724	78	5	2·07
June, 1864	5 66	3 59	0 55	2	435	2	871	1	1,112	12 42	8 59	0 82	4 65	26 48	23,317	102	0	2 25
December, "	7 03	4 79	0 73	2	777	2	949	1	1,427	16 51	11 60	1 16	6 80	36 07	21,162	95	4	1·99
June, 1865	6 13	4 68	0 80	2	907	2	1,166	1	1,416	14 75	11 78	1 30	6 64	34 48	14.320	68	0	2·25
December, "	5 69	4 72	0 69	2	443	2	75	1	1,128	12 06	10 87	1 04	5 73	29 70	17,189	72	0	1·96
June, 1866	4 85	4 31	0 76	2	262	2	758	1	1,078	10 27	10 11	1 13	5 67	27 18	23,496	101	1	2·08
December, "	4 44	4 94	0 74	2	605	2	523	1	1,116	10 07	11 02	1 11	5 16	27 36	23,556	96	5	1·69
June, 1867	4 00	4 90	0 72	2	903	2	687	1	1,065	9 61	11 30	1 07	5 98	27 97	22,153	96	4	1·94
December, "	3 54	4 56	0 75	2	890	2	642	1	1,207	8 57	10 43	1 16	4 99	25 14	24,987	104	0	1·74
June, 1868	3 41	4 60	0 76	2	466	2	875	1	1,140	7 53	11 00	1 14	6 54	26 21	26,214	100	6	2·21
December, "	4 14	4 53	0 78	2	436	2	787	1	1,011	9 00	10 64	1 17	6 52	27 33	27,448	124	5	2·15
June, 1869	4 16	4 66	0 79	2	132	2	554	1	1,366	8 57	10 47	1 27	5 24	25 56	28,808	130	0	2·04
December, "	4 95	4 98	0 82	2	80	2	375	1	1,345	10 07	10 79	1 30	6 11	28 27	33,352	155	0	1·90
June, 1870	3 98	4 89	0 81	1	2,001	2	489	1	1,059	7 53	10 85	1 20	5 05	24 62	33,357	156	0	2·15
December, "	3 78	4 72	0 81	2	32	2	579	1	1,067	7 61	10 66	1 20	4 93	24 41	33 507	156	0	2·19
June, 1871	4 23	4 86	0 79	2	61	2	814	1	1,161	8 59	11 48	1 20	8 06	29 33	16,313	86	3	2·69
December, "	3 77	4 98	0 73	1	2,032	2	493	1	916	7 18	11 06	1 03	3 84	23 12	36,301	156	0	2·23
June, 1872	3 69	5 24	0 74	1	1 921	2	252	1	944	6 84	11 59	1 05	4 60	24 08	36,311	156	0	2·27
December, "	3 75	6 22	0 75	2	116	2	749	1	1,361	7 69	14 51	1 20	5 79	29 20	32,167	156	0	2·28
June, 1873	3 85	5 95	0 75	1	2,039	2	471	1	1,410	7 36	13 15	1 20	7 40	29 11	32,676	156	0	2·30
December, "	3 85	6 02	0 73	2	60	2	796	1	1,412	7 82	14 21	1 20	6 50	29 72	26,420	131	0	2·30
June, 1874	3 86	5 88	0 66	1	2,138	2	799	1	1,140	7 39	13 64	1 00	5 44	27 49	19,521	109	3	1·84
December. "	3 86	5 75	0 61	1	1,856	2	183	1	771	7 06	11 98	0 83	5 27	25 14	21,592	100	0	1·95
June, 1875	4 28	5 30	0 57	1	1,904	2	178	1	737	8 12	11 03	0 76	3 82	23 74	21,326	104	0	1·92
December, "	3 41	5 19	0 55	1	1,678	1	2 124	1	352	5 99	10 12	0 64	3 56	20 32	21 972	92	2	1·80
Total	....	....	....	....	....	....		...	....	..	...	....	.....	.....	816,985	3,628	3	....
Average per six months	$3 61	$4 15	$0 60	2	261	2	710	1	969	$7 74	$8 45	$0 88	$4 72	$22 94	20,000	88	3	1·96

The geographical distribution of ore and coal in this country, has produced a number of well-marked classes of iron works. We have those which are placed close to the ore mines, but obtain anthracite coal by a long carriage, usually by land and water combined; others that have both ore and anthracite close to the furnace; others that are placed at great distances (often 200 or 300 miles) from both of these main supplies. The makers of soft coal iron are in precisely the same positions, and railroad transportation of fuel has its greatest extension in supplying the large furnaces on the Mississippi, which obtain ore from Iron Mountain, 100 and more miles distant, and coke from Connellsville, 500 miles and more away. The conditions are further complicated by the fact that sometimes the ore, sometimes both ore and fuel, and sometimes neither one, is mined on land belonging to the furnace owners. The Thomas Iron Works stand in the second of the classes first spoken of. 1. It mines its own ores. 2. Works low grade ores (average of 5 years, 41·6 per cent.). 3. Has short transportation (average, say, 30 to 35 miles) for fuel and ores. 4. Smelts with anthracite coal. 5. Uses large furnaces "with all the modern improvements," a very hot blast (900° F.), and high pressure. 6. Has produced on a long average, 33 per cent. of No. 1 X, 28 per cent. No. 2 X, 31 per cent. No. 2, and 8 per cent. No. 3; or, if we count these as Nos. 1, 2, 3, and 4, the general average would be 2·07. (This average is for the period ending December, 1873.)

The cost of the ore includes not only the mining expenses, but also a royalty of 25 cents a ton for brown hematite, and 50 cents a ton for magnetite. The item of labor includes also repairs and the cost of blowing in and out, to which are due the very great fluctuations in this item. The "running time" includes the total number of weeks run by all the furnaces in each half year. As the furnaces are not all of one size, the average which can be calculated from the running time and the total make, would not be correct for any one of the stacks. But as the performance of the separate furnaces is not given, no other mode of representing the running time than to credit all to one furnace was possible. The "average quality" is calculated by the ordinary mode to a uniform figure, as it would be of no advantage to represent the exact amounts of each number made in detail. As given in the table, the general average number permits a direct comparison with the calculations of foreign metallurgists.

It will be noticed that the cost diminishes pretty steadily from the beginning down to the war. This was partly due to an increasing economy in the use of coal, ore, and limestone, which indicates improvement in making up the charges; and partly to the abandonment of the system formerly in vogue, of blowing out frequently. The two furnaces with which the establishment began, blew out twice in the first 30 months, giving average runs of 35 weeks, but then we find runs of 97 weeks, 183 weeks, 196 weeks, and the like. This accounts for the low amount charged to labor in the years 1860–63. In fact, the average in this period, $2.37, indicates very closely the cost of furnace labor without repairs, in former times.

From 1863 to the end of the period included in the table, much greater fluctuations in the "labor" item will be noticed. This is partly due to the numerous alterations in the rate of wages, and partly to the fact that several furnaces were built and blown in. During this part of the time covered by the table, the average charge for labor seems to have been about $5.50, except when several furnaces stopped together, when it rose in one case to $8.06. The true charge for furnace work without repairs, would, probably, not much exceed $5.00; the average in 1869 and 1870, when there was no blowing out and only one furnace blown in, being $5.33.

At first the ore used was New Jersey magnetites, the amount being 51·18 cwt. ore, and 32·11 cwt. limestone, to the ton of pig. In the second half year brown hematite from Pennsylvania was added. From 1868 to 1873, or in five years, the charge did not vary much from 70 per cent., or 31·48 cwt. hematite, and 30 per cent., or 13·49 cwt. magnetite. The amount of limestone in the same five years averaged 30·76 cwt. This is a decrease of 7·56 cwt. of ore and flux, which, if we assume the chemical phenomena to have remained unchanged, corresponds to a saving of very close upon 9 per cent. of the fuel.

The fuel column is perhaps the most instructive of all. From an expenditure of 48·64 cwt. of coal in 1855, the amount used sank to an average of 39.56 cwt. in the 5 years, 1869–73. This saving of 9·08 cwt., or 18·66 per cent., must be accounted for in several ways. 1st. Better ores. 2d. Increased make of lower grades of iron. 3d. Higher temperature of blast.

Comparing the first half year with the last, we find that with a reduction of 0·19 or about one-fifth of a number in the grade of iron, and 1,368 pounds of ore there has been a saving of 1,530 pounds of coal, and 1,005 pounds of limestone in making a ton of pig. This economy is not, perhaps, so striking as the iron manufacture in the other parts of the world, with other fuels, has shown in the same period. The business of making iron with anthracite coal seems to be handicapped with what would be an excessive expenditure of fuel in a coke furnace. The strenuous efforts of men who are acknowledged to be experienced and able, has so far failed to place this fine natural fuel on a par with its artificial rival. The difference is not in quality, for when both fuels are calculated at 85 per cent. carbon, the expenditure of carbon in the best anthracite furnaces, in this country, working with a blast as hot as it is used on this side of the Atlantic, is from 25 to 30 per cent. above corresponding practice abroad with coke.

The most experienced men in the anthracite iron manufacture look upon this large requirement of fuel, when that coal is used, as a necessity inherent in its peculiar character. I have never been able to share that opinion. Good anthracite may fairly be estimated at 85 per cent. carbon, and at this valuation it should, but for one fact, be as good a fuel as coke or charcoal, both of which are usually valued at the same percentage of carbon, in careful calculations. That exceptional fact is that fuels of the same composition give different quantities of heat, the difference being probably due to a dissimilar construction of the molecules that compose them. The subject is obscure, and a multitude of careful experiments will be necessary before we can hope to understand it. But it does not seem probable that the difference in the value of fuels, due to this cause, can amount to as much as twenty-five or thirty per cent. Part of the excess must be attributable to the methods of smelting with anthracite. We know, from the experience of the Lake Superior furnaces, what apparatus will smelt the easily reduced ores of that region with a remarkably low minimum of charcoal fuel. Foreign works (and some American ones too) show us how ores like the Cleveland carbonate and brown hematite, or fossil ore can be smelted with a minimum of coke. But it seems to me that the secret of working the Eastern magnetites with anthracite coal has not yet been found. The minimum of fuel expenditure has not been reached, if we except some isolated cases of remarkably good work. The "reason why" for this greater consumption of anthracite appears to me to be one of the great questions of metallurgical practice in America.

Returning to the table, it will be noticed that it covers the period of greatest depression, and also that of greatest excitement our iron trade has ever known. Iron cost in the first half of 1862, $13.05, and in the last half of 1864 its cost was $36.07, the highest point it has reached. It is worthy of notice that the only one of the subordinate items of cost which rose to its maximum in that year was coal, which stood at the enormous price, to a furnace, of $7.03. Ore, limestone, and labor, were each higher at a later period, when the total cost was, however, less. Another fact is that the advance in the cost of ore has been maintained while coal has returned toward, though not to, its old point.

Coal has advanced from $2.45 in December, 1860, to $3.41 in December, 1875. Ore in the same time has increased in cost from $2.86 to $5.19. The item of labor and repairs standing at $2.46 in 1860, was $3.56 in 1875. But the former price was exceptionally low. It had averaged $4.21 all through 1859. The saving in this item has been produced probably by improvement in management and increased make.

WENGLER AND LOWE'S APPARATUS FOR CLASSIFYING LOW GRADE ORES AND THE GERMAN SYSTEM OF CONCENTRATION.

(Concluded from Page 140.)

THE FREIBERG SYSTEM AS REPRESENTED AT THE HIMMELFAHRT MINE.

In examining the method of concentrating the low grade ore of Freiberg, we shall find that a thorough system of "Hand Scheidung" or hand sorting, is the first preliminary step, and too much praise cannot be bestowed upon such preliminary steps, which are so essential to a good treatment. Intimately associated with the Freiberg ores, besides galena, we find immense quantities of blende, iron, copper, and arsenical pyrites, their successful separation rendering the Freiberg System the most complicated in Europe. With the Clausthal ore we find arsenical pyrites wanting, copper occurring only in slight traces, but an immense amount of heavy spar taking their place, and forming the only real difficulty they have in their treatment, the separation of which, from the true silver ore, is a source of much trouble, its specific gravity being so near galena. It is separated thoroughly by hand.

The Freiberg ore, after a partial hand separation in the mine, and a second preliminary separation above ground, corresponding to the crushing and rough trommel system of Clausthal, which prepares the ore for the "Scheidebank," is transported to the "Scheidebank," where the final separation takes place, through the labor of a number of boys, ranging in age from ten to fifteen years, whose duty it is to separate, as near as possible, the different ingredients, resulting in the following eight classes :

1st. Reiner Bleiglanz or pure galena, 0·20 per cent. in silver, and 60 to 80 lb. of lead to the 100 lb. Stamped dry and sent to the smelting works.

2d. Walzerz, containing galena, blende, quartz, iron, copper, and arsenical pyrites ; called Walzerz from their size of a walnut. Sent to the Walzwerk concentrating works, which will be noticed later on.

3d. Reiner Kupferkies or pure copper pyrites, stamped dry and sent to the smelting works.

4th. Schwefelkies or pure iron pyrites, sent to the roasting kilns or furnaces.

5th. Geringer Arsenkies or poor arsenical pyrites, sent to the roasting furnaces.

6th. Gute Arsenkies or pure arsenical pyrites, sent to the roasting furnaces.

7th. Zinc blende, sent to the smelting works.

8th. Pochgänge, containing blende, iron, arsenical pyrites, and quartz, with slight traces of galena disseminated, stamped in the "wet way," classified, jigged and concentrated, as will be noticed later on.

No. 8, or Pochgänge, carrying from four to ten dollars in silver, accumulates so fast at Clausthal from the Scheidebank and jigs that two hundred iron stamps, worked by a 150-horse power Corliss engine, are hardly sufficient to fulfil their office.

The accumulation at Freiberg is certainly enormous, and batteries of stamps are kept going night and day, to use up the immense heaps.

No. 2, or Walzerz, is tramwayed to the Walzwerk dressing floors, and run through a system of rollers, trommel system, jigs, and "liegenden Heerden" or quiet tables ; the two last are old-fashioned, requiring the steady attention of the workmen ; they will eventually be replaced by the popular Hartzer jigs and shaking tables.

From the jigs, in treating No. 2, we get the following, by virtue of their specific gravity :

1st. Berge or rock, thrown on the waste heap.

2d. Pochgänge, same as No. 8, and treated in the same manner, which will be noticed later on.

3d. Kiesiges Kupfererz or nearly pure copper pyrites, stamped in the dry way and sent to the smelting works.

4th. Blendiges Kupfererz—copper pyrites, with blende ; stamped dry and sent to the smelting works.

5th. Galena, mixed with iron and arsenical pyrites ; ground in a mill and sent to the smelting works.

6th. Glanz or large grains of pure galena ; ground in a mill and sent to the smelting works.

7th. Fasserz, the ore which passes through the sieves. Nearly pure galena, washed once upon quiet tables, and sent to the smelting works.

Excepting Nos. 1 and 2, all the products of jigging are nearly ready to be sent to the smelting works.

We come now to the last and most important part of the Freiberg system, namely, the classification and concentration of the Pochgänge from the Scheidebank and jigs, through a system of stamps, classificator, jigs, and shaking tables or "Stossheerden." Nos. 2 and 8, both being Pochgänge, the former in coarse grains, and the latter walnut size, are tramwayed to a battery of twenty-four stamps (old fashion), which stamp the Pochgänge to a fineness of under ½ mm. ; from the stamps the "Trübe" or stamped material is carried over into the classificator, which classifies it into five grades, ranging from 1½ mm. to under ½ mm., and completely freeing the same from their slimes.

The classified ore from the I. section (7,056 kil. diameter 1½ mm.) is carried by its own weight or gravity, to one of the popular fine corn Hartzer jigging machines, on and in which the iron and arsenical pyrites and galena are separately, and at the same time, concentrated to a very high degree.

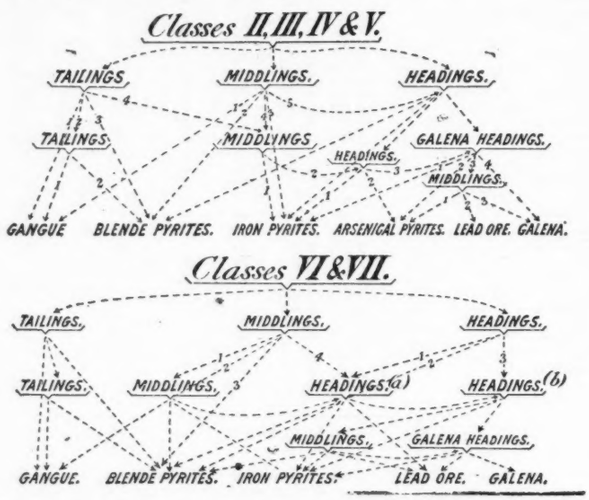
These jigs are self-acting, working continually, requiring nobody, as a steady duty, to look after them, and possessing the four great advantages of simplicity, a pure or clean product, small power to work them and great working capacity ; those on the Walzwerk dressing floors are old, similar to the old fashion hand jigs, requiring the attention of some one all the time while working.

The finer classified ore from the II., III., IV., and V. sections of the classificator, is carried by its own gravity to a series of four slow moving shaking tables (old type) ; the "Vorrath" or supply from the tables, is concentrated upon two auxiliary tables according to the following "Stammbaum" or system :

The complicated character of the ore renders such a system absolutely necessary, for it is only through such a system that they are able to separate the base metals from the galena to any degree of satisfaction.

Were the ore of a less complicated character, the classified ore from II., III., IV., and V. sections could be treated in the same manner as the first (I.), with a final washing upon fast moving Rittingers after the Clausthal system, which tables make from 100 to 120 strokes per minute ; those at Freiberg make from 20 to 40, depending upon the fineness and richness of the grain, 30-40 ; and the fineness and richness of the slimes, 20-30. The "Abgang" or waste from the jigs and tables, with concentration of the above five classes, is collected in outhouses, and sold to the city and builders as an excellent building sand.

What renders the system at Freiberg so complicated, is, that the specific gravities of the ore ingredients vary so little, rendering a separation difficult We come now to the concentration of the slimes which flow over from the classificator into the trough J, which trough conducts the slimes to an ordinary Spitzlutten apparatus of two sections, called the VI. and VII. corn classes. From the bottom of each there extends a curve p pe, which serves as an outlet for the heavier slimes, the finer flowing over the apparatus and partially settling in outhouses, and the remainder or lighter slimes flowing down a ravine to a large pond, where the final settling occurs, the lighter slimes flowing off as waste. The heavier slimes from the bottom of the Spitzlutten apparatus flow out of the curved pipes or tubes, on to four very slow moving shaking tables called "*zehen Stossheerden*," which concentrate the slimes according to the following "Stammbaum" or system :



Those pure enough are sent to the smelting works. The "zehen" tables make from 20 to 30 strokes per minute, depending upon the fineness of the slimes. Of an ore, "Pochgänge," carrying from 0.01 to 0.03 per cent. in silver, and 3 to 4 lb. of lead to the 100 lb. ; and 10 to 20 lb. of arsenical and iron pyrites to the 100 lb ; it speaks well when the silver can be concentrated to 0.12 and 0.15 per cent. ; the lead from 45 to 60 lb. ; and the arsenical and iron pyrites from 30 to 40 lb. to the 100 lb.

The following table gives the results of 100 lb. of concentrated :

Jigged and washed. } Galena : (or 0.12 to 0.15 per cent.) 12 to 15 pfundtheile silver ; 45 to 60 lb. lead.
Washed bleierz : 5 to 7 pfundtheile silver ; 15 to 25 lb. lead ; 10 to 15 lb. arsenic ; 25 to 30 lb. sulphur ; 6 to 10 lb. zinc.
Washed arsenkies : 2 to 3 pfundtheile silver ; 10 to 15 lb. sulphur ; 30 to 40 lb. arsenic ; 8 to 12 lb. zinc.
Washed schwefelkies : 1 to 2 pfundtheile silver ; 30 to 40 lb. sulphur ; 0 to 1 lb. copper ; 9 to 15 lb. zinc.
Washed blendkies : 1 to 2 pfundtheile silver ; 0 to 1 lb copper ; 15 to 20 lb. zinc.
Washed slimes : 1 to 2 pfundtheile silver ; 8 to 14 lb. zinc.

The slimes from the outhouses are dried, mixed with rich ore, and sent to the smelting works as occasion demands. Such is a simple resumé of the Freiberg system, the fundamental principles of which are similar in every respect to the Clausthal, differing only in the machinery used in concentrating the ores. The old fashion shaking table of Freiberg is unknown at Clausthal ; in their place they use "Kugel" and "Trichter Heerden" or slowly revolving convex and concave buddles, upon which their slimes are concentrated. They have introduced one fast moving Rittinger, which has given most excellent results, and they contemplate putting up three or four more at an early day ; they will be used principally to wash and concentrate the "Vorrath" or supply from the jigs.

Very fine slimes cannot be concentrated upon fast moving Rittingers ; they must be treated upon the slow revolving tables or slow moving shaking tables, and slimes, rich in silver, are concentrated better upon slow moving shaking tables, than upon slow revolving tables. Slimes, which do not grit the teeth, cannot be treated successfully.

In conclusion, too much credit cannot be bestowed upon the classificator, without which the concentration of the Freiberg ores would be a long and tedious labor, depending upon the old and foggy methods which prevailed before its introduction.

Communications in reference to the classificator, can be addressed to FRANCIS A. LOWE, E.M., 1223 6th Street, Washington, D. C., or to J. ALEX. TYLER, E.M., No. 4 Pine Street, New York.

HARDENING ZINC.—*Annales du Genie Civile.*—By introducing ammonium chloride into zinc while in fusion, 100 to 200 grms. to the kilo., any desired hardness may be obtained.—*American Chemist.*

UTILIZATION OF RAW LIGNITE IN THE BLAST FURNACE.—In 1874 the furnace of the Styrian Eisenindustrie Company were daily producing 800 cwt. dark gray Bessemer pig, from ores containing 46 to 50 per cent. iron. Per cwt. of iron the consumption of coke was 130 lb. and of limestone 30 lb., the temperature of blast about 400° C. The coke burden was 30 cwt. carrying 40 to 42 cwt. ore. The furnace possessed 6 tuyeres of 3 inches diameter, and the pressure of blast was about 2½ lb. In April, 1875, the manager had been able to replace 50 per cent. of the coke by raw lignite. He considers, as essential to the success of this charge, an increased pressure of blast, an increased temperature of hot blast, and the ore being in pieces and not in dust.—*American Chemist.*

BORACIC ACID IN LAKE SUPERIOR IRON ORES.*

By T. Egleston, Ph. D.

DURING the last Winter we have been actively engaged in the School of Mines in search for boracic acid. This has been owing to the fact that Mr. M. W. ILES, assistant in the qualitative laboratory, has discovered a test for that substance which makes its discovery exceedingly simple instead of being, as previously, very difficult. It consists in powdering the mineral, calcining it, then moistening it with sulphuric acid, and heating on a platinum wire until the sulphuric acid is expelled. It is then moistened with glycerine and made to take fire. If boracic acid is present it infallibly gives a green flame. It is not at all surprising under such circumstances, the test being so easy, that boracic acid has been found by the students in a great many cases where its presence was not previously suspected, and in some where its detection was previously too difficult to warrant looking for it. We were not prepared, however, for its discovery in Lake Superior iron ores, and were disposed, at first, to think that a mistake had been made. After, however, it had been frequently reported in these ores it was considered worth while to look for it, and having found it to ascertain in what condition it was.

It was then, to my very great surprise, discovered that certain Lake Superior ores are so completely filled with a borate that it is not possible to find the smallest piece which does not contain white specks which have proved to be a borate of lime and magnesia, which is probably a new mineral, as no borate corresponding to it is described. Sufficient quantities of it have been detached from the ore, entirely free from iron, and Mr. ILES will probably make the analysis, and publish the results before the next meeting of the Institute.

I consider this result most surprising considering the fact that so many thousand specimens of Lake Superior ores have passed through the hands of chemists. I think it is more than likely, as the boracic acid is present in such quantities in the ore, that we shall find some boron in the iron. If this is so its presence will satisfactorily explain some of the peculiarities of the Lake Superior iron. I do not think it very likely that the iron will contain very much boron, for the probability is, since the borate of lime and magnesia is exceedingly fusible, that the larger part of it will go into the slag ; but it is more than likely that some of it will be found with the silicon. Exactly what its effect is cannot be stated before an investigation is made ; but it is probable that we shall hereafter be obliged to look for boron in iron, a substance which has heretofore been unsuspected, and it certainly will be an exceedingly interesting matter to ascertain by direct experiment what its effects upon the iron are, since so little is known about it that most authors do not mention it as one of the possible impurities of iron.

ABSTRACTS OF LECTURES ON MINING.—No. X.

By Prof. W. W. Smyth, M.A., F.R.S., Royal School of Mines, London.

(From the London "Mining Journal.")

WE must now pass from the general consideration of these repositories of ore to deal with operations of a preliminary character, which usually precede the opening out of a mine. Such operations have to be undertaken by the miner in the various districts in which he may have to search, either original, where no mines already exist, or in a district where he can base his search on the foundation of some mines known in the neighborhood ; or, lastly, in order to extend certain works either in depth or length. Costeaning is a term frequently used by the miners for particular methods of searching, and a name which has come into use in the colonies is "prospecting." On these operations it is frequently the case that a great deal of money is spent, and sometimes in vain, and very great ignorance is in some instances displayed in the nature of the operations carried out, and in the search, as regards the particular class of rocks in which the openings should be made. One of the first difficulties we have to encounter is that resulting from the fact that the surface of the rock is covered by deposits of sand and gravel, vegetable matter and vegetation, and in some places, as on the granitic tract of Dartmoor, by peat bogs. But for this our operations would be comparatively easy, as it is we have to form conclusions from our observation of a small portion of the ground, which shall be applicable to very large areas. It results from these conditions that a large proportion of those mines which could be pointed out as notable ones have been discovered by a series of accidents. To take a few instances of this, one lode in the neighborhood of Tavistock was discovered by some boys out fishing, who found the gossan of a copper lode with a small quantity of ore in it ; and the Plynlimmon Mine, on the flanks of the mountain of that name, was similarly discovered by some men while fishing. In other cases it is stated that the observation of the pellets picked up by game birds has led to the discovery of lodes, as of gold in Lower Hungary ; or, again, where the ducks and geese in Australia picked up grains of gold from the beds of the streams. The famous silver mines of Potosi are said to have been discovered by an Indian, who taking hold of a bush to prevent his falling pulled it up by the roots, and thereby disclosed some masses of native silver. The copper mines of Wallaroo, in South Australia, recently brought into notice, were discovered by observing some green copper in the material thrown out by a little burrowing animal—the wombat. And one more case may be mentioned which has produced such momentous results—the discovery of gold by Col. SUTTER, a Swiss emigrant, in California, while cutting a small watercourse. This discovery led not only to a "rush" being made to that particular district, but also to search being made in South America, Australia, and other countries for similar deposits.

The minerals to be met with in stratified deposits are subject to the laws laid down by geologists, and we may depend upon it that the very best guide to the search for these stratified minerals is a thorough knowledge of geology, such as can be attained partly by reading, partly by study in the field. This being so, I propose to speak here of a few special points only. Some grievous mistakes are made by persons who have not acquired the necessary amount of geological information. Thus you hear such remarks as this, that a certain district is likely to produce coal, because the soil consists of coaly clay ; or because there is limestone somewhere near, and sandstone also near ; or because the wells and springs deposit a quantity of ferruginous matter. All these appearances, it is true, accompany the occurrence of coal in coal districts, but not always ; neither are they confined to coal districts, and that is the important point. Another guide that is sometimes held to be valuable, is the occurrence of salt springs, which are supposed to lead to the discovery of beds of rock salt ; in the new red sandstone, formerly called the saliferous strata, they are connected with such beds ; but often in the coal measures, in sinking through sandstone, the water is found to be notably salt. In some cases, again, we meet with an evolution of carburetted hydrogen, or fire-damp, from the surface of the ground, and we may then, with a good show of reason, conclude that such emanations of gas are connected with the occurrence of coal beneath. This occurs in large quantities sometimes, so that they may be applied for artificial light or heat, as in the case of the fire-wells of China ; and, again, in Hungary, where the main galleries in one mine are lighted by carburetted hydrogen, so derived. But there are cases, again, where the evolution of this gas does not proceed directly from coal, as from some of those later formations in which the Americans have sunk their bore-holes and wells for the purpose of extracting the petroleum. In dealing with these stratified deposits, therefore, it is necessary to keep in mind what is really the origin of these phenomena, which may take place, for example, in the coal measures, but are not exclusively confined to them.

In searching for minerals which are not stratified we may have three different objects to pursue, (1) to determine the course, or the back or outcrop, of a lode already known ; (2) to discover the branches, or parallels, or neighboring lodes in a district already known ; (3) to explore new ground. In the present lecture we shall consider the first two divisions of these. In these we have a series of elements given, and have to find the rest. When a lode has been worked, and is inclosed on both sides by the same rock, we shall require to trace out its average direction, and then, as we have seen, we may reasonably expect the lode to continue in that direction. It is necessary to take the average direction of the lode, for some hundreds of fathoms say, in order to avoid errors arising in one particular part from inequalities of the ground ; for it will readily be seen that in passing through a valley a lode will be carried down the valley in the direction of the dip. This appears very simple, but in practice it may be much complicated from the thickness of cover lying on the lode, or from dislocation, due to cross-courses. The miners have a notion about these heaved veins, of the truth of which I am very doubtful myself : they believe that if a lode is heaved by a cross-course it is sure to come back again into its original line, and that, therefore, if you drive straight on in the direction of the lode you will meet with the other part of it. At all events, a great deal of time would thus be spent, and in many instances I am sure the lode would never be met with again. It may be that after working only a

FIG. 11.

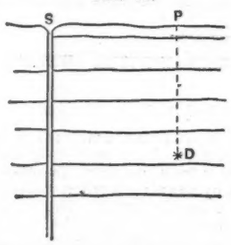
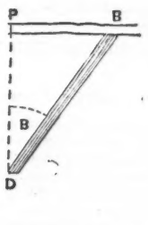


FIG. 12.



tolerable lode we come at a point, D (Fig. 11), at some distance from the shaft, S, on a rich deposit, and we require to find the back of the lode, where from cover, etc., at the surface there is no trace of it. This we can limit more or less by knowing the general strike of the lode, but we can approximate more nearly to it by a simple trigonometrical problem. Let Fig. 12 represent a transverse section through D (Fig. 11), and D B the lode ; then knowing the depth of P D and the angle B, we can readily determine the distance P B ; there will, of course, be a slight error, due to the thickness of the cover. The discovery of the lode will be much easier if it is a contact deposit, and if we can determine the junction of the two rocks which form the wall, but lodes very rarely have this character. Where the back of the lode is of a hard material, which resists the degrading influence of the atmosphere better than the country round, this back will be marked very distinctly by a ridge ; but where the lode is no harder, or even softer, than the country this will not aid us.

Where we have the back of the lode hidden by superficial deposits we proceed to find it by the method of trenching or costeaning. If the superficial deposit does not exceed 5 or 6 feet in depth a line is taken at right angles to the general run of the lode, and a trench is dug along the line to lay bare the solid rock, in order that the latter may be carefully searched for any appearance of the lode. We have seen that the lodes in a majority of instances make for the surface of the rock, but that they may occur there in a much changed condition, and, therefore, we must not be disappointed if we find what has been a good lode below is represented at the surface by only a few strings of gossan. Great care is necessary in order to observe and test any indications of the lode. If the depth of the surface accumulation be greater than in the last instance—from 10 to 20 feet—then the process of costeaning is employed. In principle it is the same as the last, only that instead of going to the expense of digging a trench along the line at right angles to the lode, a shaft is sunk on each side, and then a cross gallery (just large enough for the men to creep through and work conveniently in) is driven between the shafts. The sides of this cross-cut are carefully examined for any indications of the lode.

In examining the ground for series of parallels, or branches, or side lodes we require much the same sort of arrangement as in the last division. During the actual working of the lode cross-cuts should be driven here and there into either wall, in order to determine if there be any branches, or parallel lodes, or a portion of the lode split off by a horse. This is a point too often neglected, especially if the lode breaks away from the wall easily ; and numerous instances might be pointed out where mines have been working for some time, and extended some distance, without finding considerable sources of wealth lying close to, and discoverable by means of short cross-cuts. Supposing that it is likely that there should be at a somewhat greater distance parallel lodes, then it is necessary to search over the surface of the ground, or to drive longer cross-cuts underneath. And in some districts not only is there a parallelism between the lodes to be observed, but also the disposition of ore against ore ; hence the great tendency to examine lodes parallel to those which have proved good ones. These phenomena are well shown in the district of St. Agnes and Redruth, and also in the chart of the Alston Moor district by Mr. WALLACE. The miners think that if one lode has done well between any particular pair of cross-courses, another lode intersected by the same pair will also do well in that position, and I think there is a great deal of truth in this. In tracing the lodes over the surface you meet with interruptions : you may come on a newer formation, developed from beneath or from above. For in-

* A paper read before the American Institute of Mining Engineers, at the Philadelphia Meeting, June, 1876.

stance, you may have a mass of igneous rock coming in, and stopping your vein entirely ; or, on the other hand, you may merely have the original country overlaid by a newer formation. Here we come again to the necessity for thorough geological knowledge, in order to determine what is the relation between the two sets of rocks.

This branch of our subject takes us into that of the re-opening of old mines ; the examination of these to that end is attended with many difficulties, and hence great disappointment is often felt when the re-opened mine does not bear out the conclusion formed by the surveyor. When possible we should obtain definite official documents on the subject of the particular mine under consideration, but it is often the case when a mine has been abandoned, even only for a short time, it is extremely difficult to get any of these. If we have to trust to the statements of the old miners, or worse still, to the traditions which have been handed down from father to son, we are apt to get some very curious tales indeed, and when the documents are not to be obtained these statements must be received with extreme caution. This arises in great part from the cause that the men are apt to remember the rich parts of the mine, and to forget everything about the poorer portions. One remarkable instance of re-opening was in connection with the Wheal Vor Mine, to resume the working of which vigorous attempts were made in 1855. It was known by documents to be very rich, had been worked down to a depth of 300 fathoms, and had been abandoned only about 20 years. After £25,000 had been spent in clearing the mine of water, etc., it was found that it would not be worth working a month, and this result was due to two causes—partly to the fact that the miners remembered only the richer portions of the mine in their statements, and partly from the bad shape in which the mine had previously been worked. In limestone districts, hollows (somewhat funnel-shaped), due to the action of water, have much the appearance of old shafts ; these occur in the North of England, Carinthia, North of Spain, etc. When we come on a real old shaft the quality of the mine can be seen frequently, where we cannot get down on account of water, in the arches left here and there for support, but we must bear in mind that the miners would not be likely to leave the best pieces of the vein as arches. A great deal of information as to the nature of the old workings can often be obtained by the examination of the water which runs from the adit level, of the stuff round the shaft, of the rubbish heaps, of the slags where the metals were worked, and of the matter from the washing-floors. We must patiently and accurately gather together all this sort of information, which must be carefully and fully weighed before we can conclude whether an old and abandoned mine is worth resumption.

ON THE UCHATIUS STEEL PROCESS AT WIKMANSHYTTE, SWEDEN.

By G. Arehn.

From the Proceedings of the Institute of Civil Engineers, London.

IN this process, steel is produced by fusing, in crucibles, a mixture of finely divided cast iron with pure rich iron ore which has been previously roasted and reduced to powder. The pig iron, which is from one-third to one-fourth white (Swedish classification ?), is granulated by running it when melted into a bucketed wheel which revolves at a high velocity in water. The ore is the best quality of calcined Bispberg magnetite, stamped fine and sifted, care being taken to select only the very richest. These preparations are necessary to obtain the complete mixture of the ore and metal, essential for the production of steel of good quality. If the materials are imperfectly mixed, the steel is too hard and blows in the ingot. The proportions of metal to ore in the charge of course differ according to the nature and temper of steel required. It is usual to keep the weight of metal constant, and only to vary that of the ore.

The melting furnaces are of the ordinary Sheffield pattern, coke being used as fuel. Blacklead pots from the Battersea works, holding ½ cwt., are made red hot before charging, and they are surrounded in the furnace with charcoal, which communicates the fire to the coke. The bottoms of old pots are used as covers, and stands are used to prevent the adhesion of the slag formed by the coke, to the bottom of the pot. If this should occur, the pot is so much cooled that it becomes impossible to command a melting heat. Two pots are placed in each furnace, which usually make three meltings per day.

As soon as the coke is well ignited the furnace is closed, for about an hour, in order to warm up the pots gradually ; the draught is then increased by opening the damper at intervals of a quarter of an hour until it is completely open. About three and a half hours are required for complete fusion of the charge. The pots usually stand six meltings, but the number is mainly dependent upon the quality of the coke, which must be of the very best description. With the milder qualities, of course only a smaller number can be got ; thus in making No. 6, containing from 0·3 per cent. to 0·45 per cent. of carbon, which requires from seven to eight hours for complete fusion, the pots can only be used once.

The consumption of coke is about 71·5 bushels daily, when two furnaces, making three heats each, are in use, corresponding to about 11·6 bushels per cwt. of steel. Formerly a somewhat smaller quantity was required, the increase being due to the use of air-channels in the brickwork for cooling the walls, which keep the furnace in shape, and allow them to run longer without repair than was previously the case. The interior lining of the melting furnace is made of a mixture of coarse and fine quartz, old pots ground to a powder, but free from dust, worked up with a little fire-clay in water. The lining lasts four days without repair ; as soon as it begins to burn out, the holes are stopped with quartz bricks of about the same composition, air-dried and molded to fit. The bottoms of old melting pots are also used for the same purpose.

The steel is classified according to numbers ; No. 02 being the hardest, and No. 3 the softest, milder numbers being only produced exceptionally. The intermediate numbers are 03, 1, and 2.

No. 3	contains from	0·7	to	0·85	per cent. of carbon.
" 2	" "	0·85	"	0·95	" "
" 1	" "	0·95	"	1·10	" "
" 03	" "	1·10	"	1·20	" "
" 02	" "	1·20	"	1·30	" "

No. 02 is used almost entirely for mill-stone dressing tools, but to a smaller extent for razors. Nos. 03 and 1 are tool steels. The latter is also a first-class die steel, while No. 3 is best adapted for stone-cutting tools of all kinds.—(*Jern Koncoret's Annaler*, part 6, 1874, p. 368.)

HARDENING IRON WITH TUNGSTEN.—Tungsten is added to gray iron while in fusion. A very hard metal suitable for cutting tools is made with 4,077 kilos. gray iron and 28 grams. tungsten.—*American Chemist.*

TIN MINING IN THE STRAITS' SETTLEMENTS.

JUNK-SEYLON, or Salanga, an island on the coast of Lower Siam, is about 200 miles north of Penang ; and, although only about 20 miles long and 10 miles in breadth, the quantity of tin that has been produced for years past is something enormous. I have often heard of Junk-Seylon and its tin mines, and, with a Cornishman's natural avidity for hunting up anything in the "tin line," I resolved to embrace the first opportunity to go there. A chance offered itself, and leaving Penang in the little steamer *Petrel*, a very stormy and unpleasant run of 34½ hours brought us to Tongkah, the seaport of Salanga. We anchored about a mile from the shore, in a commodious and almost land-locked harbor, which, however, is capable of much artificial improvement.

From the jetty where we landed to the town, about ½ mile distant, we passed through a series of mines, with here and there a smelting-house. I was at once struck with the very primitive method that the Chinese have in use for producing tin, and on which I am told they can never be induced to improve. The Chinaman's first act, after selecting a piece of ground which, in his opinion, contains tin, is to erect a miniature joss-house, overlooking the pit, which he then commences to dig, and numbers of these little temples met our view, very much resembling so many Punch and Judy shows, each invariably containing a lighted taper or joss-stick, to bring good luck on the enterprise. All the mines are open, the ore being found in layers only a few feet below the surface, and in no case did I notice the depth of a pit to exceed 30 feet. The stuff is brought to the surface in baskets, carried by gangs of coolies, who, winding their way along the narrow footpaths leading to the tops of the pits, resemble so many bees in a hive. It is then roughly washed by a stream of water raised from an adjoining tank by a chain-pump, which is worked by a treadmill, and in some instances a water-wheel. The water flows back to the same tank, and, owing to its scarcity, is used over and over again. The ore, almost as soon as it is separated from the clayey soil in which it is found, is taken to an adjoining shed, and there smelted by a very rude process, in small furnaces resembling beer barrels.

Charcoal is the fuel used in melting the ore, and the blast is derived from a cylindrical bellows, worked by hand. This description, I am told, answers for nearly all the tin mines of the East, except to those which are either owned by or are under the management of Europeans. Nothing can induce the Chinaman to introduce any improvement on the system which has been handed down by his forefathers from generation to generation, and he utterly disdains the use of steam machinery. I had pointed out to me the rusty remains of what had been a first-class engine, which was imported from England some years ago by the Rajah, but which could never be worked, for its use threatened to create a panic among the Chinamen, who dreaded that the new-fangled thing would certainly cause some terrible disaster. From the summit of a lofty hill, which commanded a view of the whole island, I saw that its surface is thickly dotted with mining excavations, but little space being devoted to cultivation. After being cast in ingots, the tin is taken to the Government stores, there to await the Rajah's chap, or stamp, as an acknowledgment of duty having been paid thereon, whence it is sent to Penang for sale and transhipment to Europe.

With such easy means of production, and the low rates of freight which shipowners now accept for carrying tin, it is no wonder that your columns so frequently deplore the difficulty of Cornish mines to compete with the importation of foreign metal ; and, much as I would like to say something encouraging with regard to the future of mining in Cornwall, I fear that with the opening up of the Malay countries—Perak and Laroot, in particular—there is little chance of the supply of Straits tin falling off. Although the export of tin from Tongkah keeps gradually and sensibly declining, owing to the heavy pressure inflicted thereon by the government, new mines are gradually being opened in other places where enterprising capitalists meet with milder restrictions. In Tongkah, the various imposts on tin, payable to the Rajah, amount to 25 per cent. ; out of which, after paying all the expenses of governing the place, he has to remit annually to Siam a clear sum of $400,000.

In a lengthy interview which I had with His Highness, he stated that, although the revenue was gradually falling off, the demands of Siam were on the increase ; and he feared that unless some means of producing tin in a cheaper way could be introduced, or if the price continued at the present low figure, that nothing short of ruination was in store for his little island. Mr. ROWE, a mining engineer from Burmah, passing through to Penang, was present, and met with much entreaty from him to remain in Tongkah, and open a mine in his own way, the Rajah promising to give him land and accept only half the revenue from him that others paid ; but my fellow-countrymen, who has had some experience with native princes, thought fit to decline the generous offer.

PENANG, June 8, 1876. JASPER BLEWETT in the *West Briton.*

EFFECT OF SILICEOUS PIG IRON ON THE BESSEMER PROCESS.—P. TUNNER, *in Zeitschrift des Berg- und Hüttenmännischen Vereines für Kärnten.*—The author, after calling attention to the demand of most European Bessemer works for pig iron containing at least 2 per cent. silicon, calls attention to the fact that many Swedish furnaces produce Bessemer pigs with a basic mixture and comparatively cool blast, so as to contain not more than one per cent. silicon, the result being that it takes 9 to 10 minutes to blow 60 to 80 cwt. of iron, whereas at least twice that period is required where more siliceous irons are used. TUNNER thinks more attention to this fact should be paid for the better qualities of steel, such as tool-steel, since silicon makes the steel harder without imparting the tempering quality to it.—*American Chemist.*

DIRECT PROOF OF EVOLUTION.—A correspondent of *Nature*, taking for his text Mr. HUXLEY's suggestion that "the sole direct and irrefragable evidence of the method whereby living things have become what they are is to be sought among fossil remains," shows that important work in that direction has been lately done by three Continental scientists. M. PAUL, of the Austrian Geological Survey, in conjunction with Dr. NEUMAYER, of Vienna, a distinguished palæontologist, have recently discovered most interesting proofs of the origin of new forms by descent in a large accumulation of lake and lagoon deposits of the latest tertiary, which extends over a great portion of the Hungarian plain. The beds are about 2,000 feet in thickness, and the upper fresh water series, by far the thickest portion, contains a number of well marked zones of molluscan life. The existing genus Paludina is in great profusion, and about forty forms have been distinguished which clearly illustrate the mode of derivation of the newer from the older types. Intermediate links between forms so differentiated as to have been placed in different genera by competent naturalists have been found, and these differing forms have been thus traced to a common ancestry. Uniformity of physical conditions during an immense period renders these vast lake deposits very favorable for such investigations ; but Dr. E. MOJSISOVICS has also, in a recent monograph, shown very clearly the relations of the molluscan forms of the Alpine trias to their ancestral types in the mesozoic and palæozoic strata. This is a comparatively new department of observation, but from the interest now taken in the question of evolution it will doubtless be more and more worked out.

CONVERSAZIONE OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

Special Report of the Engineering and Mining Journal.

CORUNDUM.

MR. C. W. JENKS of Boston, made some interesting remarks on corundum, at the Thursday evening conversazione of the American Institute of Mining Engineers, at 1100 Girard Street, Philadelphia. He said that the mineral corundum or pure crystallized alumina, had been known and used by the natives of the East for many ages, who ranked its abrasive powers as next to those of the diamond. The chief sources of supply were certain districts in the Himalaya Mountains in Hindostan. As far as is known, the corundum was never legitimately mined in those districts, but it was picked up in the river valleys where it had been washed by the annual rains. The amount of corundum obtained in this way was very small, not amounting probably to more than 20 tons per annum from all Asia. The name corundum now given to this mineral, whatever be the locality where it is found, was taken from the Hindoo word kurand, or cinnamon stone, the Hindoo variety having the color of that well-known product of the Orient.

The nine most valuable gems known as the Oriental—ruby, sapphire, emerald, etc., are colored corundum. They have hitherto been found in the beds of rivers, and in the alluvial drift deposits in Burmah, Ceylon, Bactria, and India, occurring as more or less water-worn crystals. Emery, which is an impure corundum consisting of a mixture of alumina and magnetic oxide of iron, is found in many places in varying quantities, and is mined to some extent near Ephesus in Asia Minor, at Naxos in Greece, and at Chester in Massachusetts. Within a few years, discoveries have been made of veins carrying pure corundum, in the western slopes of the Blue Ridge Mountains, in North Carolina. The granitic rocks which make up the principal mass of these mountains, have been fissured in many places by large dykes of chrysolite and serpentine, in the localities where the corundum carrying veins are found. These veins traverse the dykes, and are mainly composed of chlorite and chloritic minerals, carrying with them masses of corundum.

Mr. JENKS then showed a considerable number of specimens of corundum which he had obtained from some of these veins at an elevation of about 3,000 feet above the sea.

The serpentine dyke which contains the veins from which the specimens shown were taken, is about a mile long, and from one to four hundred feet high. Five nearly parallel veins, which dip into the mountain side, have been already partially worked, and over 100 tons of corundum in all forms have been brought to the surface. The greatest depth yet reached in any of these veins is 75 feet. The corundum, which varies in size from microscopic crystals to lamellar crystalline masses, weighing as much as 300 lb., is found embedded in many aluminous minerals, some of the most common of which are albite, orthoclase, ripidolite, and Jeffersonite. This matrix makes the extraction of the corundum from the vein quite easy, blasting seldom being necessary. The specimens of corundum shown by Mr. JENKS were very varied in character; some of them had the distinctive colors which belong to the ruby, the sapphire, the emerald, and the topaz. Several specimens, in fact, showed these different colorings in concentric layers in the same specimens.

Among several crystals of different color which were shown there, was one quite handsome sapphire, which had been found in a matrix of granular corundum. Mr. JENKS stated that these crystals were sometimes found embedded in this way in corundum, and sometimes as water-worn pebbles embedded in the ripidolite. Mr. JENKS expressed the opinion that had the masses of corundum containing these crystals been exposed to water action, their lamellar structure would soon cause them to disintegrate and leave the gems as they are generally found. This fact of the discovery of these crystals associated with the massive corundum, he thought seemed to dispose of the theory heretofore held by many mineralogists, that their formation has taken place in the secondary formations. As is well known, the abrasive powers of pure corundum are greater than those of emery. Experiments which have been made with this corundum at the Springfield Armory and elsewhere, have shown it to accomplish 35 per cent. more work than the best Naxos emery. When cemented in vitrified wheels it cuts readily and rapidly granite, chilled iron, hardened steel, all the corundum gems, and even the diamond. From what has already been done it is known that this corundum can be put in the market, cleaned and graded for use, at a cost of 20 cents per pound. The specimens shown by Mr. JENKS can now be seen in the North Carolina collection of minerals, which are included in the Smithsonian collection in the Government Building.

MINING NOTES FROM MICHIGAN AND NEVADA.

MICHIGAN.—*The Calumet and Hecla Copper Mining Company* (annual report).—The annual meeting of this company was held August 16. The actual product of the mine for the year ending May 1, was 21,802,173 pounds, against 20 704,783 pounds the previous year. The average price obtained for copper is understood to be slightly higher than in 1875, when it was 20·54 cents. The average percentage of the rock will run a little over 5¼ per cent. mineral and about 4¾ ingot. The average of mineral in 1875 was a trifle less than 5¼ per cent. The following is a statement of the assets and liabilities, and the two previous years are added in order to show the financial condition of the company at the close of the past three years, ending May 1:

ASSETS.

	1874.	1875.	1876.
Cash on hand at Boston office	$49,513.76	$159,405.59	$95,870.57
Cash at mine	40,184.29	10,239.32	7,829.27
Bills receivable	16,695.67	3,754,80	3,754.80
Loans on call	253 640.00	.....	90,000.00
Copper on hand valued at	*1,596,650 58	*1,859,665.20	*1,840,273.46
Balance due on copper	1,299.34	2,166.02	3,272.98
Supplies at mine	460,642.51	436,204.56	310,903.68
Bonds of M. H. RR. Co. @ 80c	8,146.67	8,146.67	8,146.67
Totals	$2,426,772.82	$2,479,582.16	$2,360,051.43

LIABILITIES.

Bills payable	$124,248.77	$150,330.05	$132,681.57
Drafts in transit	48,978 92	51,284.78	21,294.74
Loans	.....	55,850.00	.....
Surplus May 1	$2,253 545 13	$2,222,117.33	$2,206,075.12
Dividend due May 15	400,000.00	400,000.00	400,000.00
Actual net surplus	$1,853.545.13	$1,822,117.33	$1,806,075 12

* This includes all copper sold and not delivered; in 1874 amounting to 8,841,005 lb., at 18 cents; in 1875, 9,298,325 lb., at 20 cents; and in 1876, 10,825,138 lb., at 17 cents, which price is net after deducting all cost of freight, selling, etc. It will be noted that the estimated price of copper is put very low this year, and that a gain of even one per cent. per pound on 10,825,138 pounds would give $108,251.38 net profit.

The Calumet and Hecla is of such magnitude that the company entirely discard the mineral and talk only of ingot, which is about 78¼ per cent. of the former. Reported in mineral as other mines do, the product for 1874 (financial year) would be 12,670 tons 647 lb.; in 1875, 13,219 tons 1,595 lb.; in 1876, 14,073 tons 1,395 lb.; or, given in pounds, 25,340,647, 26,439,595, and 28,147,395 lb., respectively. The steady progress of the mine will be seen clearly by the annexed monthly statements of mineral produced, which are the official figures of the company, and these differ from those reported monthly at the mine, being as actually smelted about 5 per cent. in excess:

	1874.		1875.		1876.	
	tons.	lb.	tons	lb.	tons.	lb.
January	1,009	965	1,075	1,841	1,086	1,776
February	951	1,781	1 116	1,501	1,178	1,890
March	1,040	223	1,158	900	1,306	1,618
April	1,083	1,000	1,110	1,930	1 185	1,930
May	1,063	1,817	1,059	683	1,284	157
June	1,093	1,480	1,075	1,141	1,242	1,183
For 6 months	6,242	1,266	6,596	1,996	7,282	554
July	1,085	1,043	1,129	552	*1,043	1,815
August	1,076	1,555	1,149	1,540	....	....
September	1,148	383	1,182	1,145	....	....
October	1,164	27	1,318	874	....	....
November	1,011	1,986	1,242	768	....	....
December	1,113	1,132	1,160	1,478	....	....
Total	12,842	1,392	13,780	353	†8,326	369

* Mine report. † For seven months.—Portage Lake *Mining Gazette*.
We observe a number of errors in the above figures.—ED. E. & M. J.

NEVADA.—*The Bullion Gold and Silver Mine* is located on the Comstock Lode adjoining the Consolidated Imperial. The long expected and much desired air connection between the 1,400 and 1,700-feet levels of this mine was completed on the 13th inst. This connection was of the most momentous importance to not only the Bullion but also to the Imperial Consolidated. It was a most difficult undertaking, and was carried through to complete success under very adverse circumstances. Two hundred feet north of the 1,400-feet station of the main incline, a winze was started downward toward the 1,700-feet level. At the 1,700-feet level of the Imperial shaft a drift was started north and run a distance of 1,700 feet to reach a point directly under this winze. This drift, although known as the 1,700-foot level drift, actually cuts the vein under the winze at a depth of 1,850 feet, there being a difference of 150 feet in the altitude of the two shafts. To connect the 1,400 and 1,700 feet levels at that point it was necessary to construct an incline shaft 425 feet in length. Throughout the length of the 1,700-feet drift and upraise from that level the thermometer ranges from 130 to 140 degrees making it a most difficult thing for men to accomplish even a very small amount of labor on a shift. Work was driven from both above and below, the winze from above and the upraise from below meeting at a half way point. As soon as the opening was completed a strong current of air set down the Bullion shaft, and passing out through the drift on the 1,700-feet level ascended the Imperial shaft. At the time of the connection the thermometer stood in the drift at 138 degrees, and this morning it is down to 100 degrees and is yet steadily falling. The connecting shafts are being enlarged and thoroughly timbered. Work was again resumed in the face of the north drift on the 2,000-feet level this morning. Sinking the main incline is making good progress. As soon as the connecting winze is well secured and the 1,700-feet drift has cooled a little more, prospecting the 1,700-feet level and the ground intervening between the 1,400 and the 1,600-eeft levels will be commenced in good earnest. A station has already been opened at the 1,500-feet level, and men have been set to work again in the face of the north drift on the 1,400-feet level. Prospecting and opening out on the lower levels is to be prosecuted with all the vigor possible from this time on. There is but little doubt that the Bullion will in a very short time begin to give a good account of itself. Superintendent E. A. SCHULIZ deserves great credit for so successful a prosecution of the work, under such great difficulties.

The Lady Washington Gold and Silver Mine.—This mine is located just north of the Justice and east of the Overman, and is one of the best on that portion of the Comstock Lode. The shaft has now reached a depth of 810 feet, the full size of it being in almost solid quartz, which gives some excellent assays of both gold and silver, although the general average is yet too low to pay for extracting and milling. The shaft is sunk perpendicularly, and at the depth of 600 feet penetrated a heavy clay wall, with all the characteristics of the Comstock, and a strong dip of about forty-five degrees to the eastward. After passing through this clay, streaks of quartz, mixed with porphyry and occasional strips of clay were encountered for a distance of 200 feet. The ledge has, during the last fifty feet, been gradually becoming freer of extraneous matter, until it is now composed of almost pure silica, strongly impregnated with sulphur and iron, carrying with them very favorable prospects of both gold and silver. No cross-cut has yet been made, owing to the fact that the shaft penetrating the ledge in its downward course is virtually a cross-cut of itself, and the management wished to avoid anything that would impede in the least the progress of the shaft, and the draining of the ledge at the earliest possible moment. It is a well known fact that the Woodville ledge, lying east of the Justice, has been prospected nearly to the south line of the Lady Washington, near which the rich ores of the Woodville and Justice have been extracted. That the Lady Washington shaft will cut this ledge in the next 200 feet, none doubt, as the distance is so short and the course of the ledge so direct, that striking it is only a matter of time. The ledge material and quartz in the bottom of the shaft is identical in looks and character to that found in the Woodville east of and adjoining the ore vein, and must soon lead to something better.—Gold Hill *News*, Aug. 12.

OLD MINES IN THE BLACK HILLS.—A perfectly drilled hole was recently discovered in a large boulder, lying 14 feet below the surface on a mine in the Cape Horn district, proving conclusively that mining has been done in this locality at some previous day, and it is not unreasonable to suppose that the party who came to the hills some forty years since, and were never heard of afterward, were the same who mined some in this locality and met their death at the hands of Indians at the cave, where bullet marks on the trees are plainly visible to this day.—*Deadwood Pioneer*.

INTERNATIONAL EXHIBITION OF 1876.

Special Report of the Engineering and Mining Journal.

ADMISSIONS FOR THE WEEK ENDING AUGUST 29, 1876.

Date.		Paying Visitors.	Press, Complimentary, and Exhibitors.	Total Visitors.
Previously reported	.....	2,234,350	916,614	3,150,964
August 23	91st Day	39,395	7 932	47,327
" 24	92d "	56,325	8,709	65,034
" 25	93d "	32 298	7,996	40,294
" 26	94th "	*97,172	8,420	105,592
" 28	95th "	34,799	8,427	43,226
" 29	96th "	41,320	10,142	51,462
Totals		2,535,659	968,240	3,503,899

* Admission 25 cents.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Aug. 26.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co.	24,296	1,121,330	41,741	2,065,164
D. L. and W. RR. Co.	29,225	905,780	61,588	2,044,569
Penn. Coal Co	9,695	582,132	29,389	868,284
L. V. RR. Co.	28,859	600,016	21,914	592,002
P. and N. Y. RR. Co.	1,326	17,488	1,749	72,923
C. RR. of N. J.	28,698	743,854	52,553	677,572
Penn. Canal	12,534	238,319	15,532	128,632
	134,633	4,208,919	224,466	6,449,146
Lehigh Region.				
L. V. RR. Co	61,609	1,546,048	94,514	820,909
C. RR. of N. J.	35,954	769,759	23,821	261,733
D. H. and W. B. RR.	306	27,297	1,386	48,804
	7,869	2,343,104	119,721	1,140,566
Schuylkill Region.				
P. and R. R. RR. Co.	77 746	2,554,087	170,172	2,221,152
Shamokin & Lykens Va.	13,360	500,453	22,328	788,272
	91,106	3,054,540	192,500	3,009,124
Sullivan Region.				
Sul. and Erie RR. Co.	546	27,500	—	5,557
Total	324,154	9,631,063	536,687	10,604,693
Increase	—	—	—	—
Decrease	212,533	970,630	—	—

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about seven per cent. of the whole production.

Perth Amboy business:

	Tons.
Received for the week	20,129
Shipped for the week	18,069
On hand Aug. 26	67,421

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 359,165 tons, as compared with the corresponding period in 1875.

Belvidere Delaware RR. report.	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	7,554	162,096	64,655
" " " South Amboy	13,380	290,790	107,619
Shipments at Coal Port (Trenton)	4,026	157,087	62,555
" South Amboy	15,062	306,227	164,053

Receipts of Coal at Boston, for week ending Aug. 25, and years from September 1st, 1874 and 1875.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	2,663	88,603	109,842
Philadelphia	10,808	636,206	522,380
Baltimore	7,020	146,287	169,977
Other places	5 627	293,045	255,771
Great Britain	—	4,722	3,397
Nova Scotia	806	23,610	30,795

The Production of Bituminous Coal for the week ending Aug. 26, was as follows:

Tons of 2,000 lb., except where otherwise designated.

	Week, Tons.	Year, Tons.
Cumberland Region, Md.		
Tons of 2,240 lb	43,912	1,132,687
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	7,136	213,441
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	2,522	103,435
*East Broad Top	1,471	46 346
Clearfield Region, Pa.		
*Snow Shoe	817	34,660
*Tyrone and Clearfield	23,989	744,024
Allegheny Region, Pa.		
*Pennsylvania RR	3,825	135,431
Pittsburgh Region, Pa.		
*West Penn. RR	3,412	129,082
*Southwest Penn. RR	818	38,119
*Penn. & Westmoreland gas coal, Pa. RR.	20,512	5 6,599
*Pennsylvania RR	3,083	166,722

* For the week ending Aug. 21.

The Production of Coke for the week ending Aug. 21.

Tons of 2000 lb.	Week.	Year.
West Penn. RR	731	30,457
Southwest Penn. RR	11,765	3 7,834
Penn. & Westmoreland Region, Penn. RR.	1,549	31,896
Pittsburgh, Penn. RR.	1,337	110,866
Total	15,382	501,053

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, Sept. 1, 1876

Anthracite.

THE auction sale of 500,000 tons of coal took place on Tuesday, as was announced a week ago, would be the case. The prices realized were about 50 cents per ton under what had very generally been anticipated, and were the lowest prices at which coal ever sold in this market.

The following quantities of coal, deliverable from New York shipping ports, were sold:

Size.	Del. & Hudson Canal Co.	Del., Lack. & West. RR. Co.	Phila. & Read. Coal & Iron Co.	Penna. Coal Co.	Total.
	Tons.	Tons.	Tons.	Tons.	Tons.
Lump	....	....	....	15,000	15,000
Steamer	5,000	10,000	....	5,000	20,000
Broken	40,000	30,000	5,000	20,000	95,000
Egg	25,000	15,000	25,000	7,000	72,000
Stove	40 000	40,000	35,000	25,000	140,000
Chestnut	....	15,000	10,000	8,000	33,000
Total	110,000	110,000	75,000	80,000	375,000

The Philadelphia and Reading Coal and Iron Co. sold, for delivery at Port Richmond, Philadelphia, the following:

	Tons.
Steamboat	10,000
Broken	10,000
Egg	35,000
Stove	55,000
Chestnut	15,000
	125,000

At this writing it is impossible to secure official figures of the sale, but the following are sufficiently close to answer all purposes:

Average prices secured by the several companies upon New York shipping port deliveries:

	Actual Average.	Average based on equal quantities of the several sizes.
Del. & Hudson Canal Co.	3.40	3.33
D. L. & W. RR. Co.	3.07	2.92
Phila. & Reading C. & I. Co.	2 83	2.66
Penna. Coal Company	3.05	2.98

The average price received for each size of coal was asfollows:

Lump	$2.50
Steamer	2.78
Broken	3.01
Egg	2.84
Stove	3.60
Chestnut	2.71
	2 91

As 38 per cent. of the coal offered for sale was stove coal, the actual average of the 375,000 tons was $3.14.

The average prices received for 125,000 tons sold for delivery at Port Richmond was as follows:

Steamer	$2.11
Broken	2.58
Egg	2.17½
Stove	2.60
Chestnut	1.85
	2.26

Forty-four per cent. of this coal was stove, so that the actual average of the whole quantity was $2.77.

The following is a comparison of New York prices:

Sizes.	Auction sales August 29, 1876.	Circular, August, 1876.	Average binationprices 1875.	Average Combinationprices 1874.	Average of Auction sales, 1873.
Lump	$2 50	$4 90	$5 10	$5 05	$4 11
Steamer	2 78	5 00	5 20	5 15	4 46
Broken	3 01	5 10	5 30	5 25	4 63
Egg	2 84	5 20	5 53	5 39	4 88
Stove	3 60	5 80	5 99	5 85	5 23
Chestnut	2 71	5 10	4 94	4 88	4 38
Average	2 91	5 18	5 41	5 26	4 66

The Delaware and Hudson Canal Campany's coal was the first offered for sale, and made much the highest average, buyers not appearing to realize that coal could be sold at such low figures as afterwards prevailed. Following this came the Delaware, Lackawanna and Western Railroad Company's sale, resulting in an average price considerably below cost. After this came the Philadelphia and Reading Coal and Iron Company with 200,000 tons for sale. This coal, apparently owing to the large quantity offered, and the position it held on the list, made the lowest average. This was followed by the Pennsylvania Coal Company's 80,000 tons, and as many buyers were only by this time realizing that coal had been selling at a great bargain, and that lower prices were not likely to prevail at another sale, brought on quite spirited bidding, although the average price received was but third on the list. It has been reported that Mr. A. S. SWORDS brought in considerable of this coal for the company's account. Mr. SWORDS has, for several years, made a specialty of Pittston coal, and has been constantly disposing of large quantities each month, so that although he purchased largely, he is fully able to sell, at a very fair profit, what he purchased He has already sold several thousand tons, and, having a large quantity yet on hand, offers it at the following prices f.o.b. Newburg:

Lump	$2.90
Steamer	2.90
Grate	3.15
Egg	3.15
Stove	3.80
Chestnut	3.40
Average	$3.22

This sale has shown that if the public are to "name their own prices" they do not intend to show any excessive modesty about taking care of their sales. It also shows that the market for coal is in the same condition as the markets for a hundred other articles have been for some time past, and will bring ruin upon the coal companies if they insist upon forcing excessive supplies upon it. The position of the iron market is such that if 2,000 tons of pig iron were forced upon it, it would have to sell at very marked concessions, and for less than cost while the actual requirements of trade are supplied, as a rule, in a small way, at market and not altogether unprofitable prices. Such is also the case with nearly every other article under our observation. The whole business of the country is in a condition that cannot be forced.

The average prices received at the auction sale were from 50c. to $1 per ton less than the actual cost of delivery. Circular rates of to-day in no instance show a profit, while in the majority of cases the business must result in loss at the present cost of production. It has been said that if no profit can be made by mining coal, "it will be left in the ground." In cases where the operators are owners, in fee, of the land mined, such may be the case; but, where parties only lease the properties and are bound to pay a minimum royalty whether the coal be mined or not, they will find less loss in mining at cost or perhaps even a little below it, than in remaining idle with pumping expenses, etc., so that there are prospects of a very liberal supply of coal in all events.

A meeting of such coal operators of the Lehigh, Mahonoy, and Wyoming regions, as ship over the Lehigh Valley Railroad, was held at Bethlehem on the 30th ult. The object of the meeting was to secure from the Lehigh Valley Railroad Company a sufficient reduction in freights, to enable those shipping by this route to compete with those on other lines. The railroad company submitted a scale of rates, based upon an average selling price of $3.50 per ton, f.o.b., at Perth Amboy. The through rate from Penn Haven to Amboy, on this basis, is $1.23 per ton, or 1 cent per ton per mile. The operators asked for a reduction in lateral freights; this was not granted, and the meeting adjourned to meet at Hazelton to-morrow, when it will be decided whether mining will be resumed. There should be no difficulty in securing an average price of $3.50, f.o.b., at Amboy for Lehigh coal. This would cover cost, and in some favored cases leave a small margin for profit to the Lehigh operators. Nothing has been said about the rates from the Wyoming region by this route.

The rates of freights on the Philadelphia and Reading Railroad have been fixed at $1 per ton from Schuylkill Haven to Port Richmond, a reduction of 75 cents per ton from former rates, and $1.25 from Schuylkill Haven to Philadelphia (for local use), a reduction of 60 cents. Our Philadelphia correspondent speaks fully of the prospects for operators on the line of this road.

The other companies are undecided in their rates, although we hope to be able to revise our list next week.

The Lehigh Valley Coal Company quotes Wyoming coal f. o. b. at Amboy, as follows:

Broken and Egg	$3.50
Stove	4.15
Chestnut	3 75

The Delaware and Hudson Canal Company quotes as follows, f. o. b. at Rondout, with 50c. per ton additional for delivery to carts in New York or Brooklyn:

Furnace Lump	$3.25
Steamer "	3.25
Grate	3.50
Egg	3.50
Stove	4.15
Chestnut	3.75

MESSRS. WARD, TALBOT & OLYPHANT adopt the same prices.

The Pennsylvania Coal Company announces the following prices, f. o. b. at Newburg:

Lump, per ton of 2,240 lb.	$3.10
Steamer, " "	3.10
Grate, " "	3.35
Egg, " "	3.35
Stove, " "	4.00
Chestnut, " "	3.60

Sixty-five cents per ton additional for delivery at New York.

The Lehigh and Wilkes-Barre Coal Company quotes, f.o.b., at Port Johnston, as follows:

	Lump.	Steamer.	Broken.	Egg.	Stove.	Chestnut.
Old Company's Summit	$4 00	....	$3 60	$3 60	$4 00	$3 30
Honey-Brook Lehigh	4 00	....	3 60	3 60	4 00	3 30
Wilkes-Barre	3 25	$3 25	3 50	3 50	4 00	3 30
Plymouth red ash	....	....	3 50	3 50	4 15	3 40

The Philadelphia and Reading Coal and Iron Company quotes f.o.b, Port Richmond, as follows:

	Lump.	Steamer.	Broken.	Egg.
Hard W. A. Coal	$3 00	$3 00	$3 00	$3 00
Free burning White Ash Coal	3 00	3 00	3 00	3 00
Schulykill Red Ash	.....	... ..	.....	3 10
N. Franklin Red Ash	.....	.....	4 00	4 00
Lorberry	....	....	4 00	4 00
Lykens Valley	.....	.....	4 50	4 50

	Stove.	Chestnut No. 1.	Chestnut No. 2.	Pea.
Hard W. A. Coal	$3 50	$3 00	$2 50	$1 75
Free burning White Ash Coal	3 50	3 00	2 50	1 75
Schuylkill Red Ash	3 60	3 00	.....	1 75
N. Franklin Red Ash	00	3 05	.....	1 75
Lorberry	4 00	3 05	.....	....
Lykens Valley	4 50	3 50	.....	:0

95c. freight to New York.

Retail prices are still quite unsettled. We give below the quotations at yard of Messrs. WARD, TALBOT & OLYPHANT, and the Pennsylvania Coal Company, per ton of 2,000 lb.:

Grate and Egg	$4.20
Stove	4.50
Chestnut	3.80

The Philadelphia *Ledger*, of to-day, says: "It is announced that the Delaware, Lackawanna, and Western, Pennsylvania, and Delaware and Hudson Canal Companies will to-day reduce the wages of their miners ten per cent. The strike of the coal miners of St. Clair County, Ill., opposite St. Louis, continues, and there is no prospect of an early agreement between the miners and operators. The miners at the Murpheysboro, Mount Carbon, and Centerville Mines, in Jackson and Williamson Counties, Ill., struck yesterday for higher wages, and work was suspended. These and the St. Clair County mines furnish all, or most of the coal consumed in St. Louis."

Bituminous.

The bituminous companies do not appear to know yet where they stand, although it is quite evident, with the low prices of anthracite coal now prevailing, they must lose a large amount of trade. In fact, orders for bituminous coal were countermanded the day following the auction sale. The Pennsylvania Railroad Company has not made public its policy, while from present indications it would seem that Cumberland must be forced out of the market unless cheaper production, and access to the Chesapeake and Ohio Canal can be secured. Even with the benefit of a reduced freight of two cents per ton per mile, over the needlessly long haul of the Cumberland and Pennsylvania Railroad, the established superiority of these coals will fail to command trade, when the harder anthracites are to be had by consumers at a large concession upon the producer's cost, of placing Cumberland in the Northern and Western ports. We, some time ago, advanced the opinion, that the cost of this coal at tide-water could be reduced to about $2.50 per ton. With such a cost, the trade of the Cumberland field would be secure. The prime necessity is the construction of a new road from the mines of the chief producers over a short line to the canal. A new road of 18 or 19 miles in length, would command a large and profitable business, and a charge of one and a half cents per ton per mile. With labor placed upon the same footing as in competing fields, we then estimate as follows:

Cost in cars in mines	$0 60
Haulage to Cumberland	0 27
Canal tolls, shipping and freight	1 40
Shipping at Georgetown	0 15
Cost f.o.b.	$2 42

It would certainly seem that the extent and present peril of investments in the region, and of the numerous allied interests that must be involved in their embarrassment, would guarantee the meager capital required to furnish the simple and effectual remedy and protection. At the same time, the construction of an independent road would be a most righteous judgment upon the Consolidation Coal Company, whose ruinous and suicidal policy imperils a great industry. This is the day for the overthrow of monopolies.

Coal Trade of Philadelphia.

PHILADELPHIA, August 31, 1876.

From our Special Correspondent.

New tolls, circulars, and prices for September have been issued to-day by the Reading Railroad and the Reading Coal and Iron Company. They present a strange contrast to the last circulars. Then everything was beyond all reason, now the rates are below the cost of production. That it should be in the power of any set of men to create such confusion and entail such losses on so many people is a sad comment on the legislation of this State, and it is to be hoped that what has occurred within a few days will be productive of good by suggesting a remedy against the possibility of its occurring again. The decline from the circular rate of August at Port Richmond is $1.35 on lump, $1.45 on steamboat, $1.55 on broken, $1.65 on egg, $1.75 on stove, and $1.45 on chestnut. On this reduction the Reading Railroad Company bears 75c., having reduced the tolls from $1.75 to $1, and it is easy to be seen what reduction the producer has to stand. The average price of coal at Port Carbon, by which wages have been paid, has recently been $2.30. Deducting a low average of 60c. for royalty and lateral tolls from the mines it can easily be seen that no one can produce coal at such rates, whether private individuals or corporations, so that while the Reading Railroad Company may be commended for a reduction in the charge for transportation which seems liberal and fully adapted to the times, the rates for coal are fixed without any judgment at absurdly low rates, and coal cannot long remain so cheap. The injudicious forced sale on the 29th inst. of 500,000 tons at auction is the cause of all this mischief. It would be rash to attempt to predict what will be the future course of the large companies, and we must wait patiently. But few of the collieries in the Schuylkill Region will attempt to run. The nine prices for stove are fair—for other sizes so low that the average even for those who have the best trade will still be below cost. Any one buying now may feel assured that the chance of again buying at such low rates is not likely to occur, and that the present condition of things cannot last long. The shipments will probably increase rapidly and freights are already showing much firmness, $1.15@$1.20 being readily paid to Providence, and $1.25@$1.30 to Boston. To Southern ports there is a corresponding firmness.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
" " South Amboy	8 50	....
" Orrel	6 00	6 50
Youghiogheny, Waverly Co., at Balt	4 25	5 75
Despard, West Va	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 85
Fairmount, West Va., " "	4 40	5 70
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va	....	10 00
" Splint, " at Richmond	4 50	6 00
" Gas Coal at Richmond	4 00	5 50
Peytona Cannel, W. Va at Richmond	....	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va	3 50@3 75	4 90
Cumberland, at Baltimore	3 65@3 80	5 10
Clearfield f.o.b. Canton, Baltimore	3 75@....	5 25

Rockhill Semi-Bituminous and Broad Top, at the mine, per 2,000 lb., 95, f. o. b. Greenwich, Philadelphia, per 2240 lb., $3 60@3 95, according to destination; at South Amboy, N.J., 4 60; New York, 5 00.

Clearfield and Allegheny, "Kittanning," "Sterling," "Sonman," and "Eureka," at the mines, per 2000 lb., 95; at Greenwich, Phil., per 2240 lb., 3 75@4 25, according to destination; f.o.b. South Amboy, N. J., 4 75; New York, 5 25.

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou	2 25	5 75

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$4 20	$4 50	$3 80
Lackawanna coal, in yard	4 20	4 50	3 80

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb				$18 00
Liverpool House Cannel	"	"	"	.... 22 00
American	"	"	"	.... 13 00
Cannelton splint,	"	"	"	.... 7 50
Cannelton Block,	"	"	"	.... 7 50
American Orrel	"	"	"	....11@14
Red Bank Cannel	"	"	"	..... 10 00
Cumberland	"	"	"	..... 7 00

Baltimore, Md. Aug. 29, 1876.

Reported by our Special Correspondent.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Lee" or "Diamond," Pittston and Plymouth, White ash.	In cars at depot.	By boats afloat.
Lump and steamboat	$4 87	$4 72
Broken	5 25	5 10
Egg	5 35	5 20
Stove	5 76	5 61
Nut	4 91	4 76
Shamokin. (red or white ash), and "Boston," free burning white ash,		
Egg	5 35	5 20
Stove	5 75	5 60
Lykens Valley, red ash,		
Egg and stove	6 30	5 73

From wharf or yard, wholesale, 50@75c. additional.

By retail, all kinds and sizes, per 2240 lb. .....$6 50@8 00

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 0
West Virginia Gas f. o. b. at Locust Point	4 5
Youghiogheny Gas, f. o. b. at Locust Point	4 5
Swanton	4 0

Boston. Aug. 26, 1876.

COAL seems at last to have settled pretty nearly to if not on a steadier basis. In Anthracite the Combination has gone to smash, and in Bituminous the Cumberland carrying company have been successful in resisting the suit that had been brought to regulate their tolls.

The break is quite unfortunate for the coal trade here, nearly all of whom are fairly stocked. They have bought very freely the past two months of the cargoes offering under the Combination rates, and this decline more than robs away all the profit. There are 51 dealers connected with the Boston market, who probably to-day are carrying a stock of over 200,000 tons. Four can be named who have fully half of this. Hence this break is a dead loss of over $100,000.

Under the circumstances it will be necessary that the trade do an emphatically cash business. To have as many accounts for a Winter's coal go into the creditors' lists of failed customers as has been the feature of the past year, means heavy failures in our local trade this spring; hence it is to be hoped that at the coming meeting this C. O. D. principle will be decided upon as the unswerving programme for all sales, to rich or poor.

The demand for freights has been a little more sharp, and as a consequence rates are 10c higher from New York, ranging from $1 to $1.10, and from Philadelphia from $1.20 to $1.35. Baltimore rates are unchanged from $1.35.—*Commercial Bulletin.*

Buffalo, N. Y. Aug. 25, 1876.

Reported by LEE & LOOMIS.

Connellsville Coke, Gas Steam and Cannel Coals are offered, for the present, subject to our printed conditions, at the following prices per ton of 2000 lb., delivered on cars here:

	Lump.	Run of Mine.	Nut.	Slack.	Nut and Slack.
Connellsville Coke	5 15	..	..	..	..
Brookfield Coal	4 15	..	2 85	..	..
Briar Hill	4 15	..	2 85	..	..
Youghiogheny	4 25	..	..	..	..
Monterey	3 30	3 25	..	..	..
Catfish	3 30	3 25	..	..	..
Stoneboro		..	2 50	2 00	2 30
		Broken.		..	
Sterling Cannel	5 00	4 50	4 50	..	
Cameron	3 50	2 85	..	2 00	2 30
Reynoldsville	3 65	3 25	2 85	2 30	..

Deliv'red at	Elmira Afloat.	Ithaca. Afloat.	Syracuse Afloat	Rochester. Afloat	ret. del.	Oswego f.o.b.
Grate	$2 65	$2 95	$3 10	$3 80	$5 05	$4 05
Egg	2 65	2 95	3 10	3 80	5 05	4 05
Stove	3 05	3 40	3 55	4 25	5 10	4 50
Nut	2 75	3 10	3 25	3 95	5 20	4 10

Delivered at	Erie. f.o.b.	Buffalo. Afloat.	f.o.b.	ret. del.
Grate	$4 55	$1 05	$4 55	$5 30
Egg	4 55	4 05	4 55	5 30
Stove	5 00	4 50	5 00	5 75
Nut	4 70	4 20	4 70	5 45

Chicago, Ill. Aug. 29, 1876.

No change in prices of coal. Trade quiet.

Cincinnati, O. Aug. 29, 1876.

Reported by our Special Correspondent.

Per ton of 2000 lb.	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	7½@8c.	——
Pomeroy coal "	5 @5¾c.	——
Kanawha " "	7 c.	——
Cannel coal, according to quality "	10 @16c.	——
The following are the retail prices delivered		
Youghiogheny	10c.	——
Pomeroy	8c.	——
Cannel	15@22c.	——
Kanawha Semi-Cannel	10c.	——
Anthracite, per ton		10 50@11 00
Coke, at yard	7c.	——
Coke, hard and soft, delivered	9@10c.	——

Cleveland, O. Aug. 29, 1876.

Specially reported by Messrs. BATES & MARTIN.

Herewith find quotations of our market:

Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

	For vessels,	On cars.
Youghiogheny Gas Coal	$4 10	$4 00
Cannel	4 25	4 15
Blossburgh	$5 00	$5 00
Briar Hill Block Coal	3 50	3 25
Straitsville Coal Co., lower vein	2 90	2 90
" " " whole "	2 80	2 80
Hocking Valley	2 90	2 90
Massillon	2 90	3 00
Tuscarawas Valley	2 50	2 50
Columbiana	2 50	2 50

Office of CLEVELAND COAL EXCHANGE,
89 Seneca Street, June 3d, 1876.

PRICES TILL FURTHER NOTICE.

	1 to 10 tons.	10 tons upw'd.
Massillon, Brier Hill and Mineral Ridge, lump	$4 00	$3 75
" " " " " nut	3 75	3 50
Straitsville Lower Vein, Hocking & Shawnee, l'p	3 50	3 40
" " " " nut	3 40	3 15
Del Carbo and Rich Hill, lump	3 75	3 40
" " " " nut	3 45	3 15
Columbiana, lump	3 25	3 00
" nut	2 75	2 50
Lackawanna and Wilkesbarre, egg and grate	7 50	7 30
" " stove	8 00	7 75
" " chestnut	7 75	7 50

No Anthracite coal to be sold for future delivery except it be subject to Exchange price at time of delivery.

H. E. CHUBB, Secretary.

Indianapolis, Ind. Aug. 29, 1876.

Specially reported by Messrs. COBB & BRANHAM.

Wholesale on board cars, and retail delivered to consumers. Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton.	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use	12	Youghiogheny	20
Highland Nut, " "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	120.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$9 75 per ton,
Lehigh, retail	$11 50 per ton.

Louisville, Ky. Aug. 29, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Please report our prices as follows:

WHOLESALE.

	per bushel		per bushel
Pittsburgh	12c.	Pine Hill	—
Raymond City	9c.	Kentucky	8c.

RETAIL.

	per bushel		per bushel
Pittsburgh	12c.	Peytona Cannel	20@22c.
Raymond City	11c.	Buckeye "	20c.
Pine Hill	13c.	City-made Coke	10c.
Kentucky	10c.	Anth., per ton, $10 00 to 10 50	

Screened Pittsburgh per load	$3 00
Screened Raymond City	2 75
Pine Hill (Kentucky)	2 75
Cannel	$5 to 5 50

Milwaukee, Wis. Aug. 29, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Trade is quiet. Our prices for coal are:

Retail price per ton of 2000 lb.

Lehigh Lump	$ 9 00	Briar Hill, select	$7 00
Lehigh Prepared	9 50	Blossburgh	7 00
Lackawanna (all sizes)	8 50	Cannel	8 00
Pittston	8 50	Pittsburgh	6 50
Scranton	8 50	Steam coal	5 50

New Orleans, La. Aug. 29, 1876.

Reported by C. A. MILTENBERGER & Co.

Pittsburgh coal, retail, per bbl	50c
" wholesale	30c.
" steamboats, per box	40c.
" to manufacturers	45c.
" shipments, per hhd	$5 25
Anthracite, wholesale, per ton	
" retail, "	12 50
Virginia Cannel, per bbl	80c.
Scotch " "	80c.
Mt. Carbon, wholesale, per bbl	
" " retail, "	50c.
St. Bernard wholesale, per bbl	30c.
" retail, "	45c.

Richmond, Va. Aug. 28, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Prices are now as follows:

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 00
" semi-Cannel	4 00	Clover Hill Coal	3 50
Coalburgh Splint	4 00	James River Bitum	3 30
Lewiston "	4 00	" " Carbonite,	5 00
Kanawha Gas coal	3 90		

San Francisco, Cal.

From the *Commercial Herald*, Aug. 24, 1876.

Imports from Jan. 1st to Aug. 15:

	tons.		tons.
Anthracite	9,130	Vancouver Island	63,543
Australian	61,508	Rocky Mountain	132
Coos Bay	24,394	Seattle	59,829
Cumberland	5,877	Bellingham Bay	14.570
English	20 005	Chili	2,076
Mt. Diablo	65,590		

We remark an increased inquiry for Wallsend and other Australian cargoes by the gas company, etc., resulting in the sale of several cargoes to arrive at $8, and which may also be called the spot price. The receipts for the week embrace the following cargoes: *Enoch Talbot*, 1,800 tons Seattle; *Eblana*, Liverpool, 1,874 tons; *Papillon*, 720 tons; Sydney; *Anna Camp*, from Baltimore, 1,650 tons Cumberland; *J. B. Bell*, 1,200 tons Seattle; *Henry Buck*, 1,020 tons Nanaimo; *Aurora*, 220 tons Coos Bay; *James Bolt*, 1,125 tons from Shields, England; *Henrietta*, 1,265 tons Newcastle, England. There is a strong effort making to introduce into more general use the "Wellington" from Vancouver for household purposes. There is no question as to its adaptability for domestic use. It is all screened, and is clean as well as cheap. The market is surfeited with all sorts, both here and to arrive, causing low prices to rule for anthracite, Cumberland, as well as steam coals generally.

Montreal. Aug. 28, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$4 25	Cape Breton Steam	$3 75
Pictou "	4 25	Newcastle Smiths	5 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 25	Chestnut	6 25
Stove	6 75		

Toronto, Ont. Aug. 28, 1876.

Chestnut	$7 25
Stove	7 50
Egg and grate	7 25
Bituminous coal for domestic use	6 00
" " steam	3 50@5 50
Lehigh Lump and broken	7 50
Blossburgh	6 50

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Sept. 1, 1876.

American Pig.—The unsettled condition of the price of coal has very much unsettled the minds of buyers of iron who anticipate an extraordinary reduction in the cost of making pig iron and a corresponding reduction in the price of iron. Although the prices realized for coal at the auction sale on Tuesday were more than two dollars of a reduction from nominal New York Combination rates yet it would be an extraordinary concession, if $1 per ton were taken off the actual price which ruled for furnace coal two weeks ago. Such being the case, not much of a concession can be made in the price of pig iron from this item; but, as competition is now the rule, considerable concessions may be made in freights on coal, ore, and limestone, and on the manufactured iron, so that we are quite likely to have something of a concession in the price of iron before long. We note a sale of 500 tons of forge on private terms and several hundred tons of THOMAS Iron Co's iron at our quotations. We quote No. 1 foundry at $22; No. 2. $20; and forge $19@$20.

Scotch Pig.—We note sales of 100 tons of Glengarnock and 100 tons of Coltness on private terms. Business is quiet, although better than a few weeks ago. Prices are very firm as follows: Eglinton, $26; Glengarnock, $27; Coltness, $28.

Rails.—There has been no further business reported. Prices are unchanged.

Old Rails.—We note a sale of 500 tons at $21.

Scrap.—We note a sale of 400 tons on private terms, and quote at $27 from yard.

Baltimore. Aug. 30, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

We have no change in the iron market. Sales continue light and market dull. We quote:

Baltimore Charcoal	$30@34	Anthracite No. 1	$20@21 00
Virginia Charcoal	28@33	Mottled and White	17@19 00
Anthracite No. 1	23@24	Charcoal C B. Blooms	63@65 00
" No. 2	21@22	Refined Blooms	50@55 00

Boston. Aug. 26, 1876.

PIG is just a trifle more active, the break in coal suggesting to foundry men that the opportunity to take the odd jobs available at still further reduced prices will encourage a demand. The sales have been about 100 tons in all, and have ranged from $21 to $24 50 for No. 2 to No. 1.

BAR is still selling in a jobbing way at all sorts of prices between $49 and $54. In fact, the outside this week is an exceptional extreme for refined. Common iron is very listless, ranging from $40 upwards according to buyer. In fact, all bar-iron sales seem to consider the character of the buyer rather than the make up of his order.

STEEL is very dull, with prices still quoting steady. American tool 14c@15c; American Machinery 8½c@9½c; Bessemer tires 5¾c; Sweet's Excelsior Tire, 7½c: English Tool, 15½c gold.—*Commercial Bulletin.*

Chattanooga, Tenn. Aug. 29, 1876.

Specially reported by J. F. JAMES pig iron broker, etc., 233 Market Street.

Tenn. Ala. and Ga. Charcoal, No. 1 foundry	$21@ 22		
" " " " No. 2 foundry	20@ 21		
" " " " gray forge	17@ 18		
" and Georgia coke, No. 1 foundry	18@ 19		
" " " No. 2 foundry	17@ 18		
" " " gray forge	15@ 16		
White and Mottled	14@ —		
Tennessee and Georgia cold-blast car wheel	23@ 24		
Alabama " "	23@ 24		
Old Rails	cash 22 00		
Cast Scrap	" 12		
Wrought Scrap	" 18@ 20		

Cincinnati. Aug. 29, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

We have no change to report in our pig iron market, the demand is fair and prices are firm.

CHARCOAL.

Hanging Rock, No. 1 Foundry	$24 00@25 00	—4 mos
" No 2, "	23 00@ ——	—4 mos
" Mill	20 00@21 00	—4 mos
Tennessee, No. 1, Foundry	23 00@ ——	—4 mos
Tennessee, No. 2, "	22 00@ ——	—4 mos
" Mill	20 00@ ——	—4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 00@22 50	—4 mos
" No. 2, "	20 50@21 00	—4 mos
Ohio Mill	19 00@19 50	—4 mos
Missouri, No. 1 Foundry	25 00@ ——	—4 mos
" No. 2, "	24 00@ ——	—4 mos
" Mill	23 00@ ——	—4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@45 00	—4 mos
Tennessee "	26 00@32 00	—4 mos
Missouri "	33 00@35 00	—4 mos
Alabama "	25 00@32 00	—4 mos

BLOOMS.

Charcoal	60 00@ 75 00—cash

SCRAP IRON.

Cast	50c.@ 85—cash
Wrought	1 00@1 40—cash

Cleveland, Ohio. Aug. 29, 1876.

Messrs. C. E. BINGHAM & Co., quote as follows:

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	27 00@ ——
No. 2, " " "	26 00@ ——
No. 1 Anthracite	25 00@ ——
No 2, "	23 00@ ——
No. 1, Bituminous	24 50@ ——
No. 2, "	22 50@ ——
American Scotch, No. 1, Cherry Valley	@ ——
" " B—1, " "	@ ——
" " No. 2, " "	@ ——
No. 1, Massillon	26 00@ ——
B—1, "	24 00@ ——
No. 2, "	22 00@ ——

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	27 50@ ——
No. 4 " "	27 50@ ——
Nos. 5 and 6 "	27 00@ ——

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	27 00@ ——

FORGE IRON.

No. 1, Gray	22 00@ ——
White and Mottled	20 00@ ——

Louisville. Aug. 29, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

The market continues firm for all grades of iron, with only moderate sales.

The usual time, four months, is given on quotations below:

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$23 00@25 00
No. 2 " " "	22 00@23 00
No. 1. Mill, from " "	20 00@21 00
No. 1. Foundry, from Alabama, Georgia and Tennessee ores	22 00@23 00
No. 2, Foundry, from Ala., Geor'a and Tenn. Ores	21 00@22 00
No. 1, Mill, from " " " "	20 00@21 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	22 00@23 00
No. 2, " " " " "	21 00@22 00
No. 1, Mill, " " " "	19 00@21 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores	22 00@23 00
No. 2, " " " " "	20 00@21 00
No. 1, Mill, " " " "	19 00@21 00
No. 1 Foundry, from Missouri Ores	—— @ ——
No. 2 " " " "	—— @ ——
No. 1 Mill, from Missouri Ores	24 00@25 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@45 00
" " Tennessee "	28 00@30 00
" " Alabama and Georgia Ores	28 00@40 00
" " Kentucky Ores	28 00@45 00

Milwaukee. Aug. 29, 1876.

Iron remains much the same—sales small.

per ton of 2,240 lb.

Frankfort L. S. Charcoal, No 1	$28 00		
" " " No. 2	27 00		
" " " No. 3, 4 & 5	25 00		
" " " No. 6	25 00		
Mil. Anthracite L. S., No. 1	27 00		
" " " No. 2	26 00		
Wisconsin Iron, No. 1	26 00		
Mahoning Valley Bit's No. 1	32 00		
" " " No. 2	30 00		

Pittsburg, Pa. Aug. 29, 1876.

Specially reported by A. H. CHILDS.

Prices are maintained at same rate as during the past few weeks, but the volume of trade has rather diminished. However, August is usually a dull month, and it is hoped that September may develop some improvement in demand, if not in prices.

Richmond, Va. Aug. 30, 1876.

Reported by ASA SNYDER, Esq.

There is very little doing in pig irons. Sales are rapidly effected at quotations, but the receipts are very light of first class charcoal pig iron.

Virginia Cold Blast Charcoal Pig Iron	$27 to $33		
" Warm " " "	24 to 28		
" " " Coke " " 1 X	23 to 24		
" " " " " " 2 X	21 to 22		
" " " " " " 3	20 to 21		
" Anthracite 1 X	— to —		
" " 2 X	— to —		
" " 3	— to —		

San Francisco, Cal.

From the *Commercial Herald*, Aug. 24, 1876.

We note the arrival of the ship *Arizona* from Liverpool with 500 tons pig iron and other goods, including 1,721 boxes tin plate, 1,000 lots galvanized wire, etc. The market for all sorts of goods in this line seems to be badly demoralized, and in the absence of reported sales it is difficult to give reliable quotations. Of pig iron the present nominal rate is $30@31 for Scotch and English. Tin plate—I.C. coke 10x14 and 14x20 at $7.50; I.C. charcoal, $8.50; Roofing charcoal (Terne) 14x20 at $8.25. Sheet zinc may be quoted at 9½@10c.

St. Louis. Aug. 29, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Our market remains about the same as last reported. Prices continue low, though the demand seems to be on the increase. We quote same as last.

Mo. Stone Coal No. 1 Fy.	$25@26	Massillon iron, A No 1	29@30
" " " 2 "	23@24	" " B " 1	31@—
" " Gray Mill,	22½@23	" " " 2	28@—
" Charcoal No. 1, Fy.	23@24	Cold Bl. Car Wheel, Mo.	30@33
" " " 2, "	22@23	" " " Tenn.	30@33
" " Gray Mill,	22@23	" " " Ala.	30@33
Tenn. " No. 1, Fdy	23@24	" " " H. R.	33@35
" " " 2, "	22@23	Mo. Charcoal Blooms	50@65
" " Gray Mill	22@23	" Scrap "	45@55
Va. Coke, No. 1, Fdy.	24@25	" " hammered Billets	75@80
" " " 2, "	23@24	Assorted Bar Iron	2 50, 60 days
" "Gray Mill,	21@23	No. 1 Wrought Scrap	90c. cwt.
H. R. Char. No. 1, Fdy.	25@26	Heavy cast	" 70 "
" " " 2, "	24@25	Light "	" 50
" " Gray Mill,	24@25		

Montreal. Aug. 22, 1876.

We continue to quote: Pig iron, Eglinton and Clyde, $18@19.00; Carnbroe $19@20; American $21@23; Summerlee and Calder $19@20; Langloan and Gartsherrie $20@21; Coltness $20.50@21; Hematite $26@27. Bar, per 100 lb., Scotch and Staffordshire, $2@2.15; best do., $2.30@2.35. Swedes and Norway $4.75@5.50; Low Moor and Bowling, $6.50@7.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Sept. 1, 1876.

THE week under review has not developed a feature of special interest in any of the articles of this list. Business has been very quiet, although some dealers think they note a better trade in the early future.

Gold Coin.—During the week under review, gold has ranged from 109¾ to 111⅛, and closed at 110.

Bullion.—Silver is not so strong as a week ago. The London market has declined to 53/4d. and our market to 112, while San Francisco quotes at 15 per cent. discount. Gold bars are quoted at par to ¼ per cent. premium.

Copper has been very quiet, with small sales at 18⅞@18¾c. Manufacturers are pretty well supplied after the late liberal purchases, and believing that some of the smaller mining companies must force their products on the market, are awaiting bargains.

Tin.—Straits in London is quoted at £73. In this market the quotations are as follows: Straits 17c. gold; L. & F. 16⅞c.; and banca 20. The business doing is only in a small way.

Tin Plates are quiet. We quote per box, prices in gold, as follows: Charcoal tins, $7.25@7.50, and ternes, $6.75@7; coke tins, $6.25, and ternes, $5.75@6.

Lead.—There has been no business worthy of note doing in this article. We quote ordinary domestic at 6·90c. currency, and Missouri soft at 7·05c.@7·10c. currency.

Spelter and Zinc.—With only a business in a small way. Domestic spelter is quoted at 7¼c. currency. Sheet zinc is quoted at 8¼@8¾c. gold.

Antimony is firm at 15¼c.@15¼c. gold.

Quicksilver is quoted at 45c. per lb. in San Francisco, and £8 10/ per flask in London.

The San Francisco *Commercial Herald*, of Aug. 24, say of quicksilver: "The latest London quotation is £8 10/ per bottle. With us the last sales reported were at 45c., and pending the departure of the Hongkong steamer of the 1st proximo, stocks accumulate. Quite a large business has sprung up here in quicksilver flasks or bottles. Imports for six months of 1876 by sea, 11,107 bottles; overland receipts in same time, 6,550 flasks. Six months of 1875, imports of same by sea, 25,553; none overland. Present price of empty iron flasks or "bottles," $1.30. At the close we have a private cablegram from London dated Aug. 23d, quoting the price at £8 per bottle. With us the market is firm at 45c., with free sales."

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, Sept. 1, 1876.

The enormous volume of the coal shares which changed hands last week was almost repeated during the dealings comprised in the period under review. The total sales amount to 383,000 shares. A steadier feeling is manifested in the quotations, and in the majority of instances a recovery has taken place.

New Jersey Central Railroad has advanced from 37⅜, as in the closing quotation last week, the final price being 40, which is within 1 per cent. of the highest quotation of the week. The sales amount to nearly 93,000 shares between 37½ and 41 as the extreme price.

On the night of August 27, one of the large coal shipping piers belonging to the company at Elizabethport, N. J., caught fire and was entirely destroyed, with 75 coal cars which were standing upon it, and two canal boats which were lying alongside. Some 400 tons of coal were dumped into the water. The loss is estimated at $40,000.

Delaware, Lackawanna and Western Railroad.—About 280,000 shares represents the transactions in this stock for the week; 7 per cent. will cover the extreme range between the prices: the closing quotation of 84 shows a recovery to the highest point of the week.

Delaware and Hudson Canal Company.—About 9,000 shares of this stock has changed hands at from 77 to 84 per cent., closing at the higher figure. This is a material advance on the final price in our last.

Bonds exhibit increased activity and a slight improvement in prices. The bulk of the sales have been made in the various issues of the New Jersey Central Railroad Company.

Chesapeake and Ohio Canal. One of the most gratifying features of the trade for the year is the success attained in transporting coal by steamers. The number engaged in the trade were six, of which number the Ludlow Patten made twenty-nine round trips, carrying during the season 2,882 11-20 tons, an average of 99 11-20 tons each trip. It is claimed and we think justly that by the use of steam as a motor the cost of transportation has been reduced 20 per cent; and so satisfactory has been the result to business that contracts have been made for the building of an additional number for the trade of 1876. If the cost of transportation can be reduced, as claimed, the effect will be to largely increase the tonnage of the canal.

Coupons and Interest are due on the bonds of the following during the present month.

American Coal Company. Coupons.

Cameron Coal Company. Interest is due on the bonds of this company during the present month.

Consolidation Coal Company. Coupons on the bonds of the Cumberland and Pennsylvania Railroad.

Delaware, Lackawanna and Western Railroad. Coupons on the 2d mortgage bonds of the Lackawanna and Bloomsburg Railroad and also on the 1st mortgage extension bonds.

Himrod Furnace Company. Coupons.

Illinois and Missouri Coal Company. Interest on the bonds of this company is payable during the present month at St. Louis, Mo.

Kemble Coal and Iron Company. Coupons.

New Boston Coal Mining Company. Coupons.

Delaware and Hudson Canal Company. Coupons on the bonds of the Schenectady and Duanesburg Railroad.

Spurr Mountain, Iron Mining Company. Coupons.

Union Iron Company, of Buffalo (N. Y.) Coupons.

Wheeling, Va. Iron and Nail Works Company. Coupons.

Quotations and Sales of Stocks and Bonds,

For the week ending Sept. 1, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	230	—
Consolidation Coal Co	40½	39	39	715
Spring Mt. Coal Co	—	—	*55	—
American Coal Co	—	—	*54	—
Maryland Coal Co	—	—	13½	50
Del., Lack., and West. RR. Co	84¾	77	84⅛	279,414
New Jersey Central RR. Co	41	37⅛	41	92,819
Delaware and Hudson Canal Co	84½	77	84	9,115
Quicksilver Mining Co. pref'd	19	17	17½	200
" " " Common	13¼	13	13¾	100
Mariposa Land & Min. Co. pref'd	—	—	6	100
St. Louis & Iron Mountain RR	18	16⅜	16⅜	500
Lehigh & Wilkes-Barre Coal Co	—	—	—	—
Total Shares sold				383,013
Sales for the week previous				397,152
Decrease				14,139

* Nominal.

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M	M. & S.		@109½
" " " 7's Con'ble	J. & D.		@
Cent'l RR. of N.J., 1st M., New	F. & A.	13,000	112½@113
" " " 1st Cons.		73,000	98 @ 99
" " " Convert'le	M. & N.	65,000	85 @ 88½
Lehigh & W.-B'e, Con. Guar'd.		13,000	80¾@ 80½
Am. Dock & Imp. Mt. Bonds	J. & J.		@ 94½
Del. & Hud. Can., 1st M., 1891		3,000	@110¾
" " " 1884			@
" " " 1877			@103¾
" " " Coup. 7's, 1894			@108½
" " " Reg'd 7's, 1894			@
St. L. & Iron Mountain, 1st M	F. & A.		@ 101
" " " 2d M	M. & N.		@*79
Chesapeake & Ohio 6's, 1st M.			@*27½
" " " Ex. Coupon			@
Mariposa Gold Loan con. 7s			@100½
Total sales		$167,000	

* Nominal.

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, August 31, 1876.

Prices of the coal carrying shares in this market have been quite irregular during the past week, but not in any degree were the fluctuations so violent as indicated by the quotations of the New York market. No doubt the firmness of the Reading railroad shares contributes materially to the comparative steadiness of the market, the widest difference amounting to only 2¾, and this in face of a very active market, the aggregate transactions showing an increase of nearly 80,000 shares.

Pennsylvania Railroad.—Over 107,000 shares of this stock have changed hands during the week at prices between 45½ and 48 as the extreme ranges, the closing price declining ¾ from the highest quotation.

Wages of conductors on the middle division of this road have been reduced to $2.25. The brakemen get $1.25 a decrease of thirty-five cents. On the eastern division the wages of conductors have been reduced to $2.60.

Reading Railroad.—The activity in this stock continues and sales amounted to 35,379 shares, the closing price was 44½, or ⅛ in advance of our last quotation. At one period during the week this stock advanced to 50, but it is supposed that this was due more to a sudden demand for the purpose of covering short interests than in any near improvement of the company's business prospects. The bulk of the sales have been made within the range of 44.

Lehigh Coal and Navigation Company.—This stock continues its downward course, the closing price being 32, or 2¾ lower. More than 20,000 shares changed hands during the week at between 31⅛ to 35.

Lehigh Valley Railroad.—This stock has advanced one point, or two per cent. The sales for the week amount to about 3,000 shares, a comparatively steady feeling prevailing through the transactions.

Coupons and Interest are due on the bonds of the following during the present month:

Lehigh Coal and Navigation Company.—Coupons on their converted 6 per cent. gold bonds.

Lehigh Valley Railroad Company.—7 per cent. bonds.

United New Jersey Railroad and Canal Comany.—Interest on their gold loan of 1901.

Reading Railroad.—Coupons on the 1st mortgage bonds of the East Pennsylvania Railroad.

Pennsylvania Railroad.—Interest on the consolidated mortgage registered bonds.

Schuylkill Navigation Company.—Interest on the 1st mortgage bonds.

Philadelphia and Reading Coal and Iron Company.—Interest on the 7 per cent. debenture bonds, and also on the 7 per cent. common bonds.

The Nesquehoning Valley Railroad Company announces a semi-annual dividend of 5 per cent. or $2.50 per share.

The Locust Mountain Coal Company has its dividend period during the present month.

Barclay Coal Railroad.—A dividend on the stock of this company is due during the present month.

Auction Sales of Stocks for the week have been as follows:

Cambria Iron Company.—300 shares at from $16 to $16¼ per share.

Crane Iron Company.—45 shares at from $30⅞ to $32 per share.

Delaware Division Canal Company.—11 shares at $50 per shore.

Quotations and Sales of Stocks and Bonds,

For the week ending Aug. 31, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares
Lehigh Valley RR. Co	51⅛	52	53	3,052
Pennsylvania RR.	48	45½	47¼	107,189
Reading RR.	50	43⅞	44⅜	35,379
Lehigh Coal and Nav. Co	35	31¼	32	20,550
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co	—	—	*25	—
Fulton Coal Co	—	—	*3½	—
Locust Mountain Coal Co	—	—	—	
Westmoreland Coal Co	—	—	85	—
St. Nicholas Coal Co	—	—	*1	—
Cambria Iron Co	—	—	16	—
Crane Iron Co	—	—	*25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co	—	—	71½	10
Total shares sold				166,126
Sales for the week previous				86,921
Increase				79,205

* These quotations are nominal.

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	4,000	@107
" " " 2d " "	—	@102
" " " 3d " cons	—	@ 43
Lehigh Valley RR. Con. mtg. 6s	2,000	99¾@100
" " " 7s, 1910	—	@113
" " " 6s Reg	7,000	108¼@108½
" " " 1st M. 6s coup	—	@106
Pennsylvania RR. 1st mtge. 6s	3,000	@105¾
" " " gen. " con. 1910	—	@106
" " " gen. " 6s, reg	—	@107½
" " Cons. M. 6s reg	—	@100
Phil. & Reading RR. 7s '93	—	@109
" " " G. M. 7s, reg	—	@106
" " " " 7s con	4,000	@107
" " new convertible 7s	17,300	98 @ 99
" " 6s 1880	—	@102⅝
" " debenture 6s	2,300	@ 78
Phil. & Reading C. & I. Co. Deb. 7s	—	@—
" " L. Mt. Summit Imp. tract.	1,000	@ 80
Lehigh Coal & Nav. Co., 6s '84	9,300	102½@102¾
" " " RR. 6s, '97	—	@102
" " " 6s, '77	—	@ 97
" " 6s gold loan	17,000	99 @104¼
Penn. Canal, 6s	—	@ 72½
Penn. and N. Y. Canal, 7s	2,000	@109¼
Ches. and Del. Canal, 6s	22,812	@ 85
Susquehanna Canal, 6s	1,000	@ 73
Delaware Division Canal, 6s	—	@—
Susquehanna Coal Co. 6s	—	@ 77
Buck. Mount Coal Co. 6s	—	@—
Penn. Gas Coal Co. 6s	—	@—
Honeybrook Coal Co. 7s	—	@—
Total amount of sales	$92,732	

Closing quotations, in the absence of sales, represent the latest prices bid.

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, Sept. 1, 1876.

Mining shares opened in the San Francisco market this morning, at prices which vary but little, as compared with the quotations ruling a week ago. Our exchanges indicate that the most energetic measures are being adopted to develope and increase the output of the mines in all parts of the Comstock Lode.

California.—Daily yield, 700 tons of ore. The ore breasts on both the 1500 and 1600-feet levels are yielding rich ore, and have as fine and permanent an appearance as it is possible for a mine to possess. The yield of bullion for August up to the present time, is considerably greater than it was for the same period in July, and the yield of the mine will not fall much, if any, short of $2,500,000 for the fiscal month. On the 1600-feet level it has been found necessary to temporarily suspend work in the face until the drift can be re-timbered. The face of this drift is still in rich ore. The ore in east crosscut No. 2, on the 1400-feet level, continues to show better and better as the drift advances. Sinking the C. and C. shaft is making good progress, considering the immense flow of water at the bottom. The shaft is now down 83 feet below the 1500-feet level. The mills are all kept running up to their full working capacities.

Julia.—A new survey has been made in this mine, and the course of the main south drift on the 1600-feet level has been pointed directly for the Ward shaft, for the purpose of making an air connection with that mine. The running of the drift in that course will carry it east of the ledge. It is the intention to cross-cut the ore vein at distances of 100 feet, as the main drift advances. The main south drift on the 1800-feet level is steadily advancing, the face in quartz and ledge material of a very encouraging character. The east drift on the 1800-feet level, after penetrating 45 feet of porphyry, entered a soft, fine-appearing body of ledge material, through which it penetrated a distance of 40 feet more, when a heavy, smooth clay slip was cut, and the entire face of the drift, washed into a splendid body of solid, clean-ap-

pearing quartz and ore. The extent of this new discovery, of course, is not yet known, although there is no doubt that it is a continuation of the ore found on the east side of the shaft at the 1700-feet station.

Sierra Nevada.—The 1700-feet station is completed, and a drift started to cut and prospect the ore vein at that point. On the 1500-feet level the north, south and east prospecting drifts are steadily advancing without change of value. The north and south drifts on the 1200-feet level are also making good progress, the face of each in favorable looking vein matter. The usual prospecting work is also being carried forward on the 1000-feet level, without change or interruption. A large and powerful blower is being erected to furnish air for the 1700-feet level when it is opened.

The Gold Hill *News*, of the 24th ult., has the following: "The Belcher, Savage, and Hale & Norcross will all be ready in a very few days to each set in motion their immense pumping machinery, and proceed with the active developments. The Consolidated Virginia is almost ready to drain the water and commence the opening up of their ledge on the 1700-feet level. The Bullion has obtained their needed ventilation, and are commencing the opening of their ore vein on the 1400, 1500, and 1700-feet levels. The Alpha drift is again in active progress. The Yellow Jacket has started another cross-cut, with the most favorable prospects on the 2040-feet level. The Justice yesterday struck rich ore in an east crosscut on the 800-feet level, and the Dayton has commenced cross-cutting their ledge on the 300 and 500-feet levels, which they will continue in a very short time on the 700-feet level. These and other developments to be made will probably soon uncover new bodies of ore, and insure the permanency of our bullion production."

Sutro Tunnel.—On the 15th ultimo this work was advanced 14 015 feet. The rock encountered is soft greenstone, which will require to be timbered after passing through. The details of work for the week were as follows:—Holes drilled, 270; holes blasted 322; aggregate depth, 2,193¼ feet; average depth, 8·12 feet; powder consumed, 869 lb.; exploders consumed, 310; drills sharpened, 659; rock extracted, car-loads, two tons each, 556.

Following is a Press despatch dated San Francisco, August 31.—The suits in equity brought by the Crown Point and other mining companies on the Comstock Lode against the Sutro Tunnel Company to dissolve the contracts entered into by the former, on the ground that certain conditions have not been carried out by the latter, have been transferred from the Fifteen District Court to the United States Circuit Court, and will not acted be upon till the next term.

QUOTATIONS:

	No. of feet on Vein.	No. of shares.	Aug 25.	Sept. 1.
Sierra Nevada ...	3,330	100,000	$14	$14
Union Consol'd..	000	100,000	15	14
Mexican.....	600	108,000	35	34
Ophir.....	675	108,000	54	50
California	600	540,000	59	59
Consol'd. Virginia	710	540,000	53	58
Best & Belcher...	540	100,800	48	49
Gould & Curry..	612	100,800	15	16
Savage.....	771	112,000	21	21
Hale & Norcross.	400	112,000	11	13
Chollar Potosi	1,400	28,000	95	93
Alpha Consol'd...	306	30,000	59	53
Imperial Con....	468	500,000	6	5
Yellow Jacket...	957	120,000	34	31
Kentuck	95	30,000	13	14
Crown Point ...	541	100,000	12	12
Belcher	1,040	104,000	23	25
Overman	1,200	38,400	75	73
Caledonia	2,188	100.000	8	8
Justice	2,100	105,000	29	28
Raymond & Ely..	5,000	30,000	8	7
Meadow Valley...	4,400	60,000	1	1
Eureka Consolid.	....	50,000	11	13
Eureka G. Y....	1,680	20,000	3	3
Silver Hill.....	5,400	54,000	9	11
Julia.....	3,000	110,000	9	9

THE SALT LAKE CITY SILVER ORE MARKET.

MR. J. B. MEADER, assayer, gives the following statement of the ore and metal market for the week ending August 26:

Argentiferous Lead (Base Bullion).—$80 per ton for lead; $1.17 per oz. for silver; $20 per oz. for gold. The above quotation for silver is based upon a silver contents in the lead of 80 to 120 oz. per ton of 2,000 lb.

Argentiferous Lead Ores—From 90c. to $1 per oz. for the silver contained therein, based upon a standard of 40 per cent. lead, each unit above 40 per cent. 50 cents per unit added. Each unit below 40 per cent. 50 cents deducted. Extreme prices, and only for most desirable carbonate ores, free from zinc, copper, and antimony. Ores containing zinc—For each unit of zinc above 5 per cent., deduct the value of 1 oz. of silver. Ores with a lime or ferruginous gangue subject to higher rates. Copper in all the above ores objectionable.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, Aug. 31, 1876.

THE market closes very dull and steady. Calumet steady at 160½, bid. Attention is directed to the annual report of this company, which appears in another part of this issue. Copper Falls steady at 3, bid; 11¼ is bid for Franklin. Duncan silver has been the card this week, rising from 3¼ to 4⅜, and settling off again to 4. International has felt the demand for Duncan to some extent, and has been in demand at from ⅜ to 40. National is firm at 1¼, bid, with very little stock offering. Pewabic is in demand again at 2¾. Quincy has advanced on sales from 42 to 43, settling back again at the close to 42¼, bid, but no stock offering under $43. In small coppers we have nothing to report.

DESCRIPTION.	Par Value.	No. of Shares.	CLOSING. Bid.	Asked.
Allouez	$50	20 000	$ 6 00	$ 7 00
Calumet and Hecla.....	25	80,000	160 50	161 00
Central..	25	20,000	30 25	31 00
Copper Falls.....	50	20,000	3 00	3 25
Dana.....	25	20,000	8	12½
Franklin	25	20,000	11 50	12 00
Humboldt	25	20.000	10	12½
Madisca.....	25	20,000	28	30
Mesnard	25	20,000	37½	40
Minnesota.....	25	20,000	1 25	1 50
National	15	20,000	1 25	1 50
Osceola	25	40,000	21 50	23 00
Petherick.....	25	20,000	37½	50
Pewabic	25	20,000	2 75	3 00
Phenix	25	20,000	12 50	13 00
Quincy.....	25	20,000	42 25	43 00
Ridge.....	25	20,000	4 50	5 00
Rockland	25	20,000	25	30
International Silver.....	20	60,000	40	50
Star	25	20,000	37½	50
Superior.....	25	20,000	12	12½
Duncan Silver	20	60,000	3 75	4 00

Gas Stocks.

NEW YORK, FRIDAY EVENING, Sept. 1, 1876.

THE market for gas stocks remains in the same dull condition as reported in our last.

New York City Gas Companies.—The returns of the various Gas Companies in this city to the Board of Assessors, show that the value of their personal property for this year is estimated at $1,679,730, against $2,439,614 last year. This diminution is due largely to the substitution of Petroleum for Gas, which has been largely made in stores and private residences during the past year.

Citizens Gas Company of Brooklyn.—This company announces that they will reduce the price of gas from $2.75 to $2.25 per 1,000 cubic feet, the reduction to take effect rrom Sept. 1. This is a concession to consumers worthy of note, and the example should be followed by the Brooklyn and New York companies.

Chicago Gas Companies.—An investigation is being made into the policy of abrogating the contracts with the gas companies in this city. In the course of the report we note the following:

The cost of lighting the city during the last fifteen years was as follows:

For the fiscal year 1859 and 1860, $25,000; 1860 and 1861, $39,880; 1861 and 1862, $66,500; 1862 and 1863, $47,800; 1863 and 1864, $93,939; 1864 and 1865, $95,798; 1865 and 1866, $130,511; 1866 and 1867, $120,922; 1867 and 1868, $199,782; 1868 and 1869, $200,647; 1869 and 1870, $245,976; 1870 and 1871, $287.570; 1871 and 1872, $169,140, (the year of the great fire); 1872 and 1873, $252,814; 1873 and 1874, $612 811; 1874 and 1875, $585,645.

In 1860, this city numbered 100,000 inhabitants. Now the estimated population is a little less than 500,000. All things equal, it might be supposed that the increase in the cost of lighting would bear a proportion to the increase in population. The city had increased to four times its population in 1860, and to-day the increase in the cost of lighting the city is twenty times what it was then. In the same ratio this city, now in its infancy, when it reaches a population of 1,000,000 would expend $12,000,000 for lighting purposes. The annual expenditure for street lamps alone is $600,000. A saving by the use of gas at a reasonable price would make a saving of $300,000 per year, which in ten years would amount to $3,000,000. The use of oil would make a saving in the same length of time of $10,000,000. In the city there are at least 100,000 families who are consumers at the the rate of about $13 per month.

Upon the resolution the following action was taken, and the report will be submitted in this form to the Council:

Your Committee on Gas Light, to whom was referred a resolution to abrogate the existing contract between the city of Chicago and the Chicago Gas Light and Coke Company, also the People's Gas Light and Coke Company, having had the same under advisement, respectfully report and recommend the passage of the same, and to illuminate the city with whale oil or any other illuminating agency.

Coupons and Interest are due on the bonds of the following during the present month.

Central Gas Company. Coupons.

Champlain and Urbana (Ill.) Gas Company. Coupons.

Citizens Gas Company, of Rochester N. Y. Coupons.

Laclede Gas Company of St. Louis Mo. Coupons.

Westchester N. Y. Gas Company. Coupons.

The Northern Liberties Gas Company has its dividend period during the present month.

Boston Gas Company. This Company has declared a semi-annual dividend of 2½ per cent. payable on demand.

Auction Sales of Stocks for the week have been as follows:

Southwark and Moyamensing (Pa.) Gas Company. 43 shares par $10, at $11 per share.

Jamaica Plains, Mass. Gas Company. 50 shares at 117¼ per share.

San Francisco Gas Company. We note recent sales of this stock aggregating 500 shares at from $103 to $104 per share.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Quotations "bid" and "asked" of New York City and Vicinity Gas Companies are on the $100 of stock and not on one share.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Divid.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.....	$5,000,000	$ 100	2½	Jan. '76	110	111
" " Bonds	90,000	1,000	3½	Feb. '76	102	
NewYork, "	4,000,000		5	Jan. '76	135	140
Metropol. "	2,500,000	100	5	Mar. '76	145	147½
" " Certf.	1,000,000	....	3½	" "	101	102½
" " Bonds	500,000	1,000	3½	Jan. "	102	102½
Harlem "	1.850,000	50	4	Feb. '76	116	122
Manhattan " .	4,000,000	50	10	July "	240	—
Brooklyn, B'klyn	2,000,000	25	5	June '76	180	190
Nassau " ..	1,000,000	25	4	Jan. '76	75	80
" " Certf.	700.000	1,000	3½	Nov. '76	94	95
People's "	1,000,000	10	3½	Jan. '76	49	50
" " Certf.	300,000	1,000	3½	Jan. '76	80	85
" " Bds	325,000	....	3½	Feb. "		95
Metropol. "	1,000,000	10	3½	Nov. '75	72	74½
Wmsburgh " ..	1,000,000	50	5	Jan. '76	130	135
" " Certf.	1,000,000	....	3½	Jan. "	100	102
Citizen's "	1,200,000	20	2½	Jan. '76	90	95
" " Certf.	320,000	1,000	3½	April "	99	101
J. C. N.J.....	386,000	20	5	July,'75	100	—
Centl. Westch. N.Y.	466,000	50	4	July, "	95	100
Subur'n " "	390,000	50				95

† Gold

Companies out of Town.—No changes have occurred in the quotations of the out of town companies other than noted above; we refer to our issue of 26th August, which contains the list of these.

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